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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 42.] 1945. [No. 6.

SUMMARY OF RECENT ABSTRACTS.*

V. LEISHMANIASIS.

VISCERAL.

Epidemiology: Aetiology.

In recording 136 cases of kala azar in the East African Forces, ANDERSON (p. 17) makes the point that the disease is much more common in northern Kenya and southern Abyssinia than was formerly supposed. Most of the infections occurred during the wet season, April to June, and the average incubation period was 13 weeks. [See also COLE, below.] FERRO-LUZZI (p. 194) records nine cases of kala azar in Eritrea. Though it has previously been reported in man and dogs in that area, it is not common.

THOMPSON (p. 273) reports a case of kala azar in a seaman who had served in Malta and was presumably infected there. LIPSCOMB and GIBSON (p. 550) also report a case of kala azar in an adult, presumably contracted in Malta. They note that in spite of the characteristic clinical picture, it was many months before the correct diagnosis was made.

PEÑA-YÁNEZ (p. 192), having noted certain similarities between kala azar and subtertian malaria, conceived it possible that there might be a cycle of development in *Leishmania donovani* comparable with that of *Plasmodium falciparum*, and linked in a similar manner with the febrile exacerbations which are a notable feature of some cases of kala azar. By means of frequent examination of spleen or sternum puncture material he claims to have found evidence of such a cycle of development in the parasite. He describes the various forms seen, and estimates that the cycle typically occupies 24 hours; most of the parasites are extracellular and are in the process of multiplication when the attack of fever comes on. If the patient does not show the daily rise of temperature, it is likely that there will be irregularity of the cycle.

NATTAN-LARRIER *et al.* (p. 931) have found the N. African jird (*Meriones shawi*) more suitable than the golden hamster (*Cricetus auratus*) for experimental work with Mediterranean *L. donovani*, but less suitable than the spermophile (*Citellus citellus*).

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1944, v. 41. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Clinical Findings.

COLE (p. 831) gives a detailed description of 60 cases of kala azar in East African Native troops. The infections were contracted near Lake Rudolph or elsewhere near the Kenya-Abyssinia border, and the incubation period, which could be assessed fairly accurately, was from two to four months. The clinical features included abdominal pain, diarrhoea, characteristically irregular fever, but with a remarkable degree of physical fitness. Enlargement of spleen and liver occurred relatively late, and glandular enlargement was present in half the cases. A rash was seen in many cases; this began on the face and spread to the trunk and arms, and in some cases progressed to form warty growths. Leishmania were present in scrapings from these skin lesions, and it was noted that the rash, though common in patients who recovered, was found in only one of the 22 fatal cases. In diagnosis, gland puncture should first be made, followed by spleen or marrow puncture if necessary, and scrapings of skin lesions should always be examined. BURKE (p. 833) comments on the statement by Cole and his colleagues that abdominal pain is a feature of kala azar, and remarks that in his experience in Assam, abdominal pain is almost a diagnostic symptom.

SHELLIM (p. 833) describes a case of kala azar in which the liver, but not the spleen, was enlarged. This gave rise to a suspicion of hepatitis, but leishmania were cultivated from blood and sternal marrow.

Though acute agranulocytosis has often been reported as a complication of kala azar in China, it has rarely been seen in India. DAS GUPTA and SEN GUPTA (p. 468) now report a case in a child in Calcutta, who died in spite of treatment with pentnucleotide. They describe the pathological appearances found post mortem.

BRAHMACHARI (p. 18) discusses the dermal leishmaniasis which may be found after recovery from kala azar, pointing out that it has been recorded only in India. He (p. 550) describes a case of this kind and remarks that although some of these cases respond to antimony, others may be completely resistant to it.

SEN GUPTA (p. 17) has continued earlier research on the value of the WITEBSKY, KLINGENSTEIN and KUHN antigen in the complement fixation test for kala azar. The results indicate a high degree of specificity even in cases in which the aldehyde test is negative. Positive results may be given in severe leprosy, but the test is negative in all the other diseases likely to be considered in differential diagnosis.

Treatment: Control.

The effect of antimony in kala azar, in the opinion of BOIX BARRIOS (p. 271), is due, not to a direct action on the parasite, but to an action on the cells of the reticulo-endothelial system of the host; antimony resistance is a result of failure of this action. Not infrequently the first effect of antimony treatment is the production of a negative phase in which all the symptoms are accentuated, and which is followed by a phase of improvement. The author states that in some cases in which both kala azar and malaria are present, treatment with antimony eradicates both infections.

GOODWIN and PAGE (p. 20) studied the excretion of organic antimonials by means of a polarographic procedure. Much of the antimony is excreted in the urine within a few hours of injection, and a large proportion of the pentavalent preparations remains pentavalent, but there is evidence that some part is reduced in the body to the trivalent state. Though proof is lacking, it may be, as generally supposed, that the pentavalent compounds are leishmanicidal only after reduction in the body.

KIKUTH and SCHMIDT (p. 194) describe two preparations of solustibosan. The first is concentrated solustibosan, which contains five times as much antimony as the original solution, yet is absorbed, after intramuscular injection, without irritation. The second is a suspension of solustibosan in oil. This can be injected intramuscularly and is absorbed within 48 hours. The action of the suspension is apparently more continuous than that of the watery solution, and cure of kala azar is possible with fewer injections and less antimony. In Spain, for children, five injections, each of 1 cc. per kgm. body weight, were given at intervals of two days, and were well tolerated. Results were good except in severe cases, in which a second course was needed. Concentrated solustibosan was also satisfactory when given intramuscularly for kala azar, and has also proved successful in the treatment of oriental sore by local injection. These two preparations may constitute a definite advance in the therapy of Mediterranean kala azar and oriental sore. LOZANO MORALES (p. 195) and GIL BERMÚDEZ (p. 655) also write of the favourable effect of concentrated solustibosan and the oily suspension, in the treatment of kala azar. These preparations are of low toxicity, and are well tolerated, there being neither local nor general reactions.

KORNETOV and MIRZOYAN (p. 272) report favourably on solusurmin, the Russian equivalent of solustibosan, in the infantile kala azar of Central Asia.

GIRAUD and REVOL (p. 109) have used an organic antimonial, for the treatment of kala azar, which they name pentastib. This is apparently useful, but the best drug, in their opinion, is urea stibamine. Pentamidine is useful at the beginning of treatment in young children and in severe cases.

In the treatment of kala azar in East African troops infected in the area near Lake Rudolph COLE (p. 831) has found urea stibamine to be the most successful drug. Stilbamidine was not so effective, but the author admits that the dosage employed may have been too low. He places emphasis on the value of blood transfusion, especially where secondary anaemia is present, with oedema, epistaxis and bleeding from other mucous membranes. Every opportunity must be taken to improve the wasted condition with meat and a diet rich in vitamins.

SOMERS (p. 654) gives an account of five patients with the Sudan form of kala azar who responded well to treatment with stilbamidine. Kala azar in the Sudan is notoriously resistant to antimony, but although the author admits that the period of observation of these patients is not long, it seems that four can be regarded as cured. The fifth showed some abnormalities of the blood when this paper was written.

SÜSSKIND and ROTH (p. 377) report two cases of kala azar in children in Palestine, in which cure was obtained after long-continued treatment with stilbamidine, and ROTH (p. 551) reports cure of kala azar by 42 intravenous injections of that drug.

SEN GUPTA (p. 736) refers to patients with kala azar and tuberculosis, for whom treatment with antimony is contraindicated because its effect on the tuberculous condition is always disastrous. He quotes a case in which the kala azar was cured by treatment with stilbamidine, without aggravation of the tuberculous process. This treatment, therefore, seems to offer a solution of what was at one time an insoluble problem.

The same author (p. 273) refers to delayed reactions which have been observed in 17 of 104 cases of Indian kala azar treated with stilbamidine. The neuropathic symptoms, confined almost entirely to the face, first made their appearance 3–4 months after completion of the course of treatment. They consisted of sensory disturbances and dissociated anaesthesia, and there were no nervous lesions elsewhere. The cause of these disturbances is, presumably, a toxic degeneration in the principal nucleus of the fifth nerve in the pons. The condition shows a tendency to slow recovery.

HENRY (p. 196) has made further observations on the changes which exposure to light makes in solutions of stilbamidine, a subject which had previously been investigated by several other workers. Details should be sought in the original abstract, but the author suggests, on theoretical grounds, that 2-(4′-amidino phenyl)-6-amidino indene should be a stable product and might possess all the advantages of stilbamidine as a therapeutic agent. DEVINE (p. 930) describes a colorimetric method of estimating the concentration of stilbamidine, by means of which he has shown that in a solution exposed to good window light for two hours, about two-thirds of the compound are transformed into a derivative which does not respond to the test.

ADAMS (p. 20) reports apparent cure by propamidine in a case of Indian kala azar.

NAPIER and SEN GUPTA (p. 18) treated 32 cases of kala azar with pentamidine; 29 were cured but one subsequently relapsed, and the authors remark that it is not yet possible to say how many will be permanently cured. Toxic reactions are less severe than those provoked by stilbamidine. In an Editorial in the same journal it is pointed out that in India kala azar usually responds well to pentavalent antimony compounds, which do not produce unpleasant symptoms such as those provoked by the aromatic diamidines, but that in the Sudan antimony is less successful. SEN GUPTA (p. 736) later followed up 22 of these patients, who were apparently cured by pentamidine. Of these, 12 relapsed, and in view of this finding he regards pentamidine as a drug which possesses some degree of curative action, but as less useful than stilbamidine and the best of the pentavalent antimonials.

BURKE (p. 469) describes the methods adopted for the control of kala azar in certain tea plantations in Assam. These methods included isolation and treatment of all discovered cases, constant mass surveys by inspection and the application of the aldehyde test, and thorough investigation of contacts. If a serious outbreak occurred the infected coolie lines were burned. Regular spraying of the houses and of the surrounding bush was carried out with a view to destroying the sandfly vector. Cultivation of cleared areas being a potent method of sandfly control, the establishment of gardens was always encouraged.

CUTANEOUS ORIENTAL SORE.

STERNFELD (p. 551) notes that cutaneous leishmaniasis, endemic in Palestine near the Dead Sea and Jericho, has recently spread to Haifa and the northern part of the country.

ELMES and HALL (p. 833) report 10 cases seen at Kano, Nigeria, in which the diagnosis of oriental sore was confirmed by the finding of *L. tropica*. They have therefore proved the accuracy of earlier statements that cutaneous leishmaniasis is found in Nigeria.

DAVER and AHMED (p. 21) report the occurrence of oriental sore in Hyderabad State.

On epidemiological grounds PARROT and GOUGIS (p. 736) suggest that *Phlebotomus roubaudi* may be a vector of *Leishmania tropica* in parts of French West Africa.

SACHDEVA (p. 470) has used local intradermal injections of quinacrine (atebrin) with success in the treatment of oriental sore. Injections are given round the sore until it is completely infiltrated. One series may be enough, but it may be necessary to repeat the procedure at weekly intervals.

MUCO-CUTANEOUS (AMERICAN)

McCORD (p. 656) writes of the cutaneous leishmaniasis of Yucatán, which is contracted by gum collectors who, during the rainy season, enter the jungle

in the course of their work. There is no precise information as to the actual method of transmission of this disease.

PESCE and PARDO (p. 110) have found leishmaniasis in several parts of Peru, and give information on the sandflies collected in their investigation.

COSTA (p. 737) notes that the initial lesion of American muco-cutaneous leishmaniasis occurs on exposed parts of the skin. He quotes a case in which a painless ulcer surrounding the thumb nail was found to contain the parasites.

REY (p. 110) gives a description of the cellular reactions which take place after subcutaneous injection of cultures of *Leishmania brasiliensis* into hamsters.

COSTA (p. 1011) reports a case of nasal polypus, apparently due to leishmaniasis of the American type.

Prognosis in cases of American muco-cutaneous leishmaniasis, in which the mucous membranes are severely involved, is not good, and LUIS CARRI (p. 737) urges the importance of treatment when the disease is in the early, cutaneous stage. Several forms of treatment are mentioned, which give good results if applied early.

PEÑA CHAVARRIA *et al.* (p. 551) claim to have treated American muco-cutaneous leishmaniasis successfully, by administration of a solution of tartar emetic by the mouth. The initial dose in children is about 1 mgm. a day, which is increased to the limit of toleration without diarrhoea or vomiting; in adults the initial dose is greater. Cure has been obtained in 3–4 months by this method.

Charles Wilcocks.

MALARIA.

McCOY, O. R. **Malaria and the War.** *Science.* 1944, Dec. 15, 535–9.

This is a paper, written in general terms, on the enormous part malaria has taken in the present war, with a brief account of the drugs now used in cure and prophylaxis, and of the other measures which should be adopted for prevention. The final section refers to the possible spread of malaria to areas hitherto free, or relatively free, from it, either by the introduction of the vector mosquitoes or of persons harbouring the infection. *Charles Wilcocks.*

BECKMAN, H. **Will Returned-Soldier Malaria menace Wisconsin?** Reprinted from *Wisconsin Med. J.* 1944, Dec., 7 pp., 2 figs. [19 refs.]

There can be no doubt that malaria will be brought to many parts of the U.S.A., including Wisconsin, by soldiers returning from malarious countries; as the diagnosis of malaria is often difficult, the author suggests that a competent malariologist should tour the State of Wisconsin and instruct its physicians in the diagnosis and treatment of the disease.

Anopheles quadrimaculatus is present in a large part of the densely populated area of the State, and several outbreaks of malaria in recent years have shown that it can transmit malaria in this State. The time of the year when an infected soldier returns will be important; if he infects mosquitoes during the early part of the summer, malaria may spread, but if he only returns in time to infect the last brood of mosquitoes in the autumn, it is very unlikely that the infection in the mosquitoes will survive the winter. It is possible that some foreign strains of malaria parasites may not be transmissible by *A. quadrimaculatus* and the fact that this species of mosquito prefers animals to man diminishes the risk of outbreaks of malaria.

The possibility of the introduction of new species of *Anopheles* is more serious, as was shown by the introduction of *A. gambiae* into Brazil; it is unlikely to happen in Wisconsin but precautions against it should be maintained.

Prisoners-of-war camps are unlikely to be a danger as mosquito control there is satisfactory. The population of Wisconsin is also protected by its relatively high standard of living, and by the fact that most houses are screened. Should an epidemic arise there are ample means of dealing with it successfully. There is no reason to think that malaria will become endemic in Wisconsin.

The author gives references for the various points discussed and for support of his conclusions. *J. F. Corson.*

SHUTE, P. G. **Malaria in England.** *Pub. Health.* 1945, Mar. v. 58, No. 6, 62–5.

ADHICARY, B. M. **Malaria in Infants.** *Indian Med. Gaz.* 1944, Dec., v. 79, No. 12, 594–5, 3 charts.

On a tea estate in Assam, during a period of 5 years, records were kept of the incidence of malaria in infants at different ages during their first year of life, of the incidence of malaria in these infants in different months of the year, and of the monthly rainfall. The object was to determine roughly the period when mosquitoes were infective in the field.

Of 349 children born during the 5 years, 71 became infected during their first year of life, the greatest number (19) at three months of age; the highest incidence (18) was in September, and the highest rainfall occurred from May to September, the peak being in June. *J. F. Corson.*

MANSON-BAHR, P. & MUGGLETON, W. J. **The Persistence of** *Plasmodium ovale.* [Memoranda.] *Brit. Med. J.* 1945, Mar. 17, 369.

A patient had an attack of quartan malaria in Sierra Leone in June 1939, and was treated with plasmoquine compound which, however, produced plasmoquine poisoning and had to be stopped; a second attack of fever in July was treated adequately with quinine and mepacrine. After a leave in Britain, the patient returned to Sierra Leone, suffered from subtertian malaria there, and finally returned to Britain in August 1942 and has remained here since. In December 1942 she had fever which was treated with mepacrine and quinine though no parasites were found.

She remained well, more or less, until March 5th, 1944, when she developed high fever (106°F.) with headache, lumbar pain, and vomiting; this recurred at 48-hour intervals. When seen on March 10th, a fairly heavy infection of half-grown *P. ovale* was found; she was treated with mepacrine and quinine and has remained well since.

As a possible explanation of the long persistence of *P. ovale* in this patient, the authors mention SHUTE's theory [this *Bulletin*, 1940, v. 37, 289] that some of the sporozoites may remain in the tissue cells from the time of the mosquito bite instead of entering the blood stream; or there might be an exoerythrocytic cycle like that in bird malaria, though it has not yet been demonstrated in man.

This case shows that *P. ovale* may cause serious illness with high fever or, as the authors have shown [this *Bulletin*, 1937, v. 34, 585], with symptoms simulating appendicitis. *J. F. Corson.*

MATTINGLY, P. F. **New Keys to the West African Anophelini.** *Ann. Trop. Med. & Parasit.* 1944, Dec. 30, v. 38, Nos. 3 & 4, 189–200, 2 figs. [17 refs.]

Since the publication of Leeson's keys to the larvae and adults of West African anophelines [this *Bulletin*, 1939, v. 36, 810] five species have been added

to the known anopheline fauna of that region. Three of these are recorded for the first time in West Africa, in the paper under review: *Anopheles implexus*, *leesoni*, and *rivulorum*. The key also includes larval characters of *Anopheles flavicosta* and *wellcomei*, which had not been described at the time when Leeson's key was published, and larval and adult characters of *A. marshalli*, *theileri* var. *brohieri*, and *obscurus* var. *nowlini*, which were not included by Leeson. Characters are also included for separating *Anopheles coustani*, *obscurus*, *rufipes* and *gambiae* from their varieties.

Larvae of *Anopheles rivulorum* and *leesoni* are recorded as having been collected from the Oshun and Erinle Rivers, near Oshogbo, and in the Oyo Province, all in Southern Nigeria. *A. leesoni* has also been recorded from Northern Nigeria. *Anopheles implexus* is recorded from the highlands of the Gold Coast. [No condensation of the real subject is possible. The keys will be found of great use to all workers in this field.] *G. Macdonald.*

EYLES, D. E. **A Critical Review of the Literature relating to the Flight and Dispersion Habits of Anopheline Mosquitoes.** *Pub. Health Bull. No. 287.* Wash. 1944, 39 pp. [Bibliography.]

The length of flight of anophelines determines the radius of control needed around habitations, and as the cost depends on the area to be controlled, which varies with the square of the radius, it is of great practical importance to measure it accurately and not adhere to generalizations which may involve either excessive cost or ineffective control.

It is important to differentiate between the maximum range of flight and the effective range at which disease is commonly transmitted, usually less than the maximum. The flight varies greatly in different species and under different conditions. For each species there is an ordinary flight between breeding place and the source of blood; in some species such as *A. maculipennis* there may be also a seasonal flight associated with hibernation, up to a radius of nearly nine miles, and in any species dispersion may be increased by very prolific breeding, absence of nearby sources of blood, favourable winds or artificial means such as vehicular traffic.

Experimental study is by the liberation of marked mosquitoes. The original method of marking by spraying mosquitoes with a solution of dye has been superseded by the use of metallic powders such as aluminium or gold stripings containing a proportion of minute particles which adhere to the insect without causing it harm. Advance has also been made in the field marking of mosquitoes in the larval stage by the addition of Giemsa and other stains to the water, though this method is subject to the disadvantage that subsequent detection is very slow.

Experimental insects may be marked by applying the dye or dust on wild mosquitoes in their natural resting places, or by marking and releasing artificially reared adults near a natural breeding place, or by marking wild adults captured for the purpose and again released. It is important to ensure that they are released near the site of capture as disorientation may affect the length of flight. Most of the observations, however, have been based on an estimate of the distance of the nearest breeding place from the site of capture of wild adults, a method which is open to several fallacies.

All available evidence on the flight range of different species of anophelines has been collected, and it is summarized in this paper in a form which should be consulted in the original by all interested. The flight range of the important anopheline vectors is tabulated as follows:—

TABLE I.—*A Tabular Summary of the Data Available on the Flight Range of the Important Anopheles Vectors.*

	Maximum observed flight range	Maximum flight proved by experiment	Maximum noted seasonal flight
A. albimanus ...	1·0 mi. (LePrince, 1912)	1·17 mi. (Zetek, 1915)	12 mi. (Curry, 1934).
A. culicifacies ...	0·5 mi. (Christophers, 1904)	0·31 mi. (Afridi *et al.*, 1940)	—
A. darlingi ...	0·11 mi. (Davis & Kumm, 1932)*	—	—
A. fluviatilis ...	0·5 mi. (Stephens & Christophers, 1902)	—	—
A. funestus ...	4·5 mi. (DeMeillon, 1933)	4·5 mi. (Adams, 1940)	—
A. gambiae ...	3·0 mi. (Symes, 1930)	4·25 mi. (Adams, 1940)	—
A. maculatus ...	0·5 mi. (Watson, 1933)	1·38 mi. (Wallace, 1940)	—
A. maculipennis...	5·5 mi. (Demokidov, 1925)	4·38 mi. (Ottolenghi *et al.*, 1929)	11·25 mi. (Shipova, 1936)
A. maculipennis atroparvus	5·6 mi. (Swellengrebel & Nykamp, 1934)	8·7 mi. (Swellengrebel & Nykamp, 1934)	—
A. minimus ...	1·0 mi. (Harrison & Ramsey, 1933)	—	8·0 mi. (Manson & Ramsey, 1933)
A. minimus flavirostris	2·5 mi. (Craig, 1909)	1·4 mi. (Russell & Santiago, 1934b)	—
A. multicolor ...	8·0 mi. (Kirkpatrick, 1925)	—	—
A. pseudopunctipennis	—	3·7 mi. (Rickard, 1928)	—
A. quadrimaculatus	1·75 mi. (Smillie, 1926)	2·5 mi. (Eyles & Bishop, 1943)	—
A. sacharovi ...	2·8 mi. (Kligler, 1924)	—	8·7 mi. (Kligler & Mer, 1930)
A. sergenti ...	1·55 mi. (Kligler, 1924)	—	3·7 mi. (Kligler, 1928)
A. stephensi ...	1·5 mi. (Afridi & Majid, 1938)	—	—
A. sundaicus ...	2·8 mi. (Schuurman *et al.*, 1929)	4·0 mi. (van Breeman, 1920)	—
A. superpictus ...	4·3 mi. (Missiroli, 1927)	—	Mentioned as occurring (Missiroli, 1927)
A. umbrosus ...	"Considerable distances" (Barber, 1918)	—	—

* This observation was made during a study of a subject other than flight range, but was the only reference found to this species.

[This important paper consolidates our knowledge and at the same time reveals the many deficiencies in it. It should form a basis for much further work on this subject.] *G. Macdonald.*

REEVES, W. C. **Preliminary Studies on the Feeding Habits of Pacific Coast Anophelines.** *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Dec., v. 3, No. 4, 261–6. [23 refs.]

"Precipitin tests have been run on blood from the stomachs of freshly engorged *Anopheles maculipennis freeborni*, *Anopheles pseudopunctipennis*, and *Anopheles punctipennis* collected in the field from various parts of the Pacific Coast area of the United States.

"Tests were run on 473 smears from *Anopheles maculipennis freeborni* and 3·0 per cent. of this group had fed on man. The highest rate for any single area was 7·1 per cent. positive to human blood.

"From *Anopheles pseudopunctipennis* 178 smears were tested with 0·6 per cent. having fed on man.

"For *Anopheles punctipennis* 52 smears were tested of which 3·8 per cent. had fed on man."

YOLLES, T. K., YOLLES, S. F. & BYRD, D. A. **On the Occurrence of** *Anopheles pessoai* **in Trinidad, B.W.I.** *Science.* 1944, Dec. 15, 547–8.

Anopheles pessoai has been found in Trinidad and there is a strong indication that it was introduced there by aeroplane from the South American continent. Little is known of the ability of *A. pessoai* to transmit malaria, but the importance of this finding is rather that it shows the danger of the introduction of *A. darlingi* by the same means; the distribution of the two species coincides in some areas. *A. darlingi* is a known dangerous vector where it occurs.

Charles Wilcocks.

BURGESS, R. W. & YOUNG, M.D. **Methods of Handling and Feeding** *Anopheles quadrimaculatus* **Say upon Malarious Patients.** *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Dec., v. 3, No. 4, 241–7, 3 figs.

In 1943 the authors reared 100,000 specimens of *A. quadrimaculatus* in their insectarium and 14,000 were infected with malaria by feeding them on malaria patients.

The insects were housed in small glass cages, each mosquito having its own cage. The cages are figured diagramatically. Optimum blood feeding was obtained between 50 and 72 hours after emergence, provided that the mosquitoes were given a feed of sugar solution 12 hours or more previously. The authors found that mosquitoes pre-fed on sugar solutions took blood more readily and lived longer than those not pre-fed. Females exposed to mating fed better than virgins—84 per cent. of the former and 58 per cent. of the latter. Also, the mortality was slightly higher among the virgins. [Presumably the spermathecae were not dissected for confirmation of fertilization.]

No appreciable difference was found as regards willingness to feed within variations of temperature ranging between 68°F. and 90°F. The mosquitoes fed more readily when they were held on a patient screened from the light. Covering the jars containing the mosquitoes increased the feeding on the light side of the room by 9 per cent., but only by 1 per cent. on the dark side.

In some trials 95 per cent. fed in 5 minutes. [The authors do not state whether they consider this to be due to the type of patient or to some external conditions which stimulate the mosquitoes to feed.] After the mosquitoes had taken an infected blood meal, they were kept in an insectarium where both temperature and humidity were controlled. Until the mosquitoes were killed for dissection they were fed on a syrup solution.

P. G. Shute.

FERRIMAN, D. G. **Diagnosis of Malaria in West Africa.** *Brit. Med. J.* 1945, Mar. 10, 328–30.

This paper is based on experience of more than 2,000 cases of malaria in white personnel at an R.A.F. hospital in West Africa, nearly all *P. falciparum* infections. The vast majority of patients had never been exposed to malaria infection before arrival in West Africa where their stay had been comparatively short. Drug suppression (mepacrine 0·2 gm. twice a week) and antimalaria discipline were enforced. Pernicious cases were uncommon: there were nine cases of blackwater fever, four of cerebral malaria and one of choleraic type; all recovered. There was no algid case, and chronic malaria was very rare.

Parasites are not always found in the blood. A description is given of the symptoms that have been helpful in diagnosis in the absence of positive blood findings. For routine purposes, a temperature of 103°F. was taken as a dividing line between seriously and not so seriously ill cases. Seriously ill cases were treated at once unless the symptoms indicated a definitely non-malarial disease. In the great majority of low fever cases, it was possible to arrive at a shrewd diagnosis within 48 hours.

In 136 consecutive low fever, suspected malaria, cases, immediate treatment was withheld. Blood slides were examined on admission and then night and morning. Parasites were found in 90 of these patients—in 66 in the first slide, in 14 more within 24 hours, and in six more within 48 hours; in only 4 patients were parasites first seen after longer intervals.

Of the clinical features assisting diagnosis, splenomegaly was important; 25 per cent. of 406 consecutive patients had splenic enlargement, as compared with about 5 per cent. of the personnel outside hospital. Tenderness of the spleen was almost pathognomic, and tenderness under the left costal margin, in the absence of a palpable spleen, was of great diagnostic value. Some or all of the common early constitutional symptoms—headache, backache, aching limbs, dry cough, vomiting, fever, splenomegaly and herpes—were noted alone in 83 per cent. of 345 consecutive cases, coryza or productive cough in 9 per cent., simple diarrhoea in 4·5 per cent. and dysentery in 0·75 per cent.

"Subclinical malaria" was not uncommon in ambulant members of the staff. Recurrent headache was the chief complaint; sometimes backache, aching limbs and malaise. Antimalarial treatment produced a sense of well being. The incidence was about 10 per cent. of the total strength. Blood slides were usually negative. The absence of anaemia, and the general condition, did not justify a diagnosis of chronic malaria, and latent malaria suggests the absence of all symptoms.

Treatment of malaria was continued for twice as long as the pyrexial period, with a minimum of seven days. Mepacrine 0·1 gm. thrice daily was given for a maximum of 10 days; it was then replaced by quinine, 10 grains twice daily, if longer treatment was indicated. For the first two or three days quinine, 10 grains thrice daily, was given in addition to the mepacrine. The ambulant cases of subclinical malaria were given mepacrine 0·1 gm. and quinine five grains daily for two weeks, and then mepacrine 0·1 gm. for six days a week, either temporarily or permanently. *Norman White.*

MARSHALL, J. M. **Spontaneous Rupture of the Malarial Spleen.** *U.S. Nav. Med. Bull.* 1944, Oct., v. 43, No. 4, 743–7.

A Marine corporal, home on leave, had a dull, generalized, aching pain in the abdomen. He stayed quiet but six hours later he had severe abdominal pain and vomited once. A doctor was called who gave a hypodermic injection of hyoscine, grain 1/100, morphine, grain ¼ and cactoid grain 1/60 [presumably a

preparation of *Cereus grandiflorus*]. The injection was repeated in an hour because of the persistence of severe pain and the patient was taken by ambulance to a hospital 25 miles away.

On admission the patient was acutely ill. His blood pressure was 125/75, pulse rate 120, temperature 97·8°F. and respirations 20 per minute. He appeared to have a perforated abdominal viscus, and immediate laparotomy was performed, approximately 10 hours after onset of the initial symptoms. Free blood was found in the abdomen and a greatly enlarged spleen was the source of bleeding. The large purple spleen, 25 by 15 by 8 cm., was ruptured transversely through the middle but the capsule was intact on the pedicle side. A triangular fragment of spleen, 6 by 8 by 10 cm., had become completely detached from the border of the fracture line and was floating free in the abdominal cavity which contained at least 1,000 cc. of blood. The spleen was removed. The peritoneal cavity was washed out with warm saline and 5 gm. of crystalline sulphanilamide were instilled into the splenic fossa. The wounds were closed without drainage. Blood transfusions were given. The patient left hospital four weeks after operation, in good condition. An attack of *P. vivax* malaria was the only complication of convalescence.

There was no history of trauma in this patient. He had had 14 attacks of malaria during the preceding twelve months, nine of which had been spent in the south-west Pacific.

The diagnosis of intraperitoneal bleeding is not always easy. In patients who have, or who have had, malaria and in whom an acute abdominal emergency develops, spontaneous rupture of the spleen must be considered as one of the possibilities. Immediate splenectomy is the only treatment. Whole blood or plasma should be administered promptly to compensate for the loss of blood.

Norman White.

WATERMAN, J. A. **Cases of Malarial Nephritis or Nephrosis.** *Caribbean Med. J.* 1944, v. 6, No. 5, 359–60.

ROBERTSON, J. N. **Ophthalmologic Lesions encountered in Tropics, with special reference to Ocular Manifestations of Malaria.** *North Carolina Med. J.* Winston-Salem. 1944, Oct., v. 5, 483. [Summary taken from *J. Amer. Med. Ass.* 1944, Dec. 23, v. 126, No. 17, 1118.]

" According to Robertson, optic neuritis and amblyopia are at times associated with malaria. The amblyopia has to be differentiated from that which is due to quinine. In quinine amblyopia the condition depends on the retinal anemia resulting from the toxic spasm of the arterioles ; there is extreme pallor of the optic disks and contraction of the visual fields. This picture is in direct contrast to the hyperemic disk and retina associated with malarial toxemia.

" Malarial amblyopia occurs as a result of the action of the malarial toxin on the optic nerve and retina. Often optic neuritis and papillary edema result from the blocking of the retinal and choroidal vessels by parasites and leukocytes. The retinal hemorrhages are usually small, multiple and peripheral ; large macular hemorrhages do occur in the malignant types of malaria. Ulceration of the cornea is the most common ocular sequela of malaria, and recurrent iritis is frequently associated with this keratitis. Supraorbital neuralgia precedes the corneal lesions. Photophobia and lacrimation are characteristic signs and often precede the corneal lesions by days or weeks. On an island in the Southwest Pacific the author encountered many patients with intraocular disturbance among men between the ages of 20 and 30. Many had suffered some depletion of the powers of accommodation and convergence, as was manifested by the complaints of reading difficulties, scotomas and muscle imbalance, particularly

exophorias. Subjectively the complaints were loss of vision, frequent headaches in the occipital and temporal regions, dizziness, pain in the eyeballs, tenderness on palpation, photophobia, lacrimation and spots before the eyes. The objective findings were irregularity of the pupils, retinitis of the atrophic type, usually in or around the macular area, unusual concentration of choroidal pigmentation, generalized hyperemia of the retina and nerve head, optic neuritis both mild and severe, optic atrophy and in a few cases a severe progressive choroidoretinitis and uveitis. Some of the patients who were evacuated were followed up by the author since his return. Some of them now have a chronic uveitis."

ROSENBERG, A. A. **Effect of Malaria on Serologic Tests for Syphilis.** *Bull. U.S. Army Med. Dept.* 1945, Jan., No. 84, 74–90. [23 refs.]

After discussing the incidence of false positive reactions in malaria (with numerous references) in various types of tests for syphilis, the author describes a study which he carried out.

His objects were:

(i) to determine which test gave the smallest number of false positive reactions, and

(ii) to discover whether it was possible to distinguish malaria from syphilis on the basis of definite patterns of positivity among the different tests.

The tests chosen were the standard flocculation tests of Kahn, Mazzini, Eagle, Hinton and Kline and the standard complement fixation test of Kolmer; all antigens used were approved by the authors of the respective tests, and the published techniques were followed in detail. Blood was obtained from patients with positive smears for plasmodia at certain intervals: 1–4 days, 7–10 days, and 12–30 days; the malaria infections were grouped as *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium falciparum* and *Plasmodium vivax* and "not classified." Results are shown in the following table:—

Species of parasites	Percent of total cases	Percentage of positives					
		Kahn	Kolmer	Mazzini	Eagle	Hinton	Kline
Falciparum	20	48	23	52	15	9	37
Vivax	70	48	21	51	9	3	33
Falciparum and *Vivax*	2	70	52	87	29	17	17
Not classified	8	37	17	47	47	10	41

From this it will be seen that the Hinton test gave the smallest number of false positive reactions, and that double infections gave more false positives than single ones.

The author constructed a second table from the above showing *expected* incidence of false positive reactions in the general malaria population in the particular locality surveyed in the present report. This gives the following percentages: Mazzini 51·0, Kahn 47·5, Kline 33·6, Kolmer 20·4, Eagle 10·4, and Hinton 5·8.

The following clinical observations were made: The strongest false positive reactions occurred 7–10 days after the chill, and they persisted for 4–6 weeks; reactions remained positive longer in *P. falciparum* infections. When there was a recrudescence of the malaria, the tests became stronger or remained at a high

level ; the serologic reaction was not influenced by the stage in the life-cycle of the parasite at the relevant time. Fever was not the cause of the positive reactions, and these latter were not affected by the antimalarial remedies, mepacrine, pamaquin or quinine.

The author attempted to discover whether malaria could be distinguished from syphilis by the results of serum tests. In malaria, the Kahn and newer Mazzini tests were generally 3+ or 4+, the Kolmer ± or +. The Kline varied from ± or + to 2+ or 3+ ; when the Eagle or Hinton tests were positive, they quickly reverted to negative ; the Hinton test was the most sensitive in cases of syphilis ; in malaria cases there were only 2·3 per cent. 4+ Kolmer reactions, whereas in syphilis in this age group 40 per cent. would be expected ; when malaria was coincident with syphilis all tests became stronger during the malaria attack, but after four weeks the original pattern was restored. In such cases, if malaria is present syphilis can almost certainly be excluded if the Hinton test is negative.

Divergent results of tests of malarial bloods are probably due to variations in technique introduced by serologists, and to differences in the antigens ; much also depends on the time when the blood is taken relative to the finding of parasites.

It is concluded that:

(i) Of all generally accepted tests, the Hinton yields the smallest percentage of false positive reactions in malaria.
(ii) Malaria can often be distinguished from syphilis by the pattern of positivity of tests.
(iii) Persistence of positive reactions beyond six weeks, in the absence of continued malarial infection, should arouse a suspicion of syphilis.

T. E. Osmond.

MAVEETY, H. M., TURNBULL, R. B., Jr. & BAUER, C. R. **Kodachrome Photomicrography in Malaria : Rapid Method of Instruction.** *U.S. Nav. Med. Bull.* 1945, Jan., v. 44, No. 1, 134–41, 3 figs.

Lantern slides made by colour photography from stained blood films are very useful for class instruction in the recognition of malarial parasites in circumstances where few microscopes are available and the pupils are unfamiliar with microscopical methods, and where rapid instruction is necessary. The technique is simple and can be used by any good amateur photographer ; the equipment comprises a microscope, a standard Burton light source (100 watts), a Leica camera, and Eastman Kodachrome film, 35 mm. in rolls of 18 exposures ; this film should be of the artificial light type A, indoor. A white substage condenser is used and a compensating filter (Eastman Kodak Company) to eliminate the green tint in the transparency. The light source is 8·5 cm. from the concave mirror of the microscope, and the photographic film is 20 cm. from the 10× eyepiece ; an oil immersion objective is used. Exposures of $\frac{1}{4}$ to 1 second are suitable. The arrangement is shown in diagrams.

Wright's stain was found to be unsatisfactory because the eosin in it causes the red or pink of the blood film to have a greenish tint in the photograph; the following modification of Giemsa's stain was found satisfactory : Giemsa stain 1 part, Giemsa buffer solution 10 parts, methylene blue solution (1 : 10,000) 0·4 part ; stain for 40 minutes. [GIEMSA (*Münch. med. Woch.*, 1935, v. 82, 1076, stated that he used Weise's buffer solution (this *Bulletin*, 1933, v. 30, 727). Weise found a buffered water of *p*H 7·2 the best for diluting Giemsa's stain ; it contained "potassium phosphate of Soerensen" (KH_2PO_4) 0·49 gm. and "sodium phosphate of Soerensen" (Na_2HPO_4) 1·14 gm., per litre. For showing Schüffner's, Maurer's [Stephens & Christophers] and Ziemann's dots, he raised

the *p*H to 7·5 by adding to this solution 20 cc. of 1/10 N (25 drops of 10 per cent.) NaOH solution to the litre.] *J. F. Corson.*

GREEN, R. A. **Totaquine in the Treatment of Malaria.** *Bull. U.S. Army Med. Dept.* 1945, Jan., No. 84, 51–7, 2 charts.

In a foreign theatre of war, a controlled study was made of the relative efficacy of totaquine, quinine and atabrine [mepacrine], respectively, in the treatment of malaria. During a period of 11 weeks, 304 cases of malaria were admitted to hospital. The total strength of the battalion concerned was only 511, so the admission rate was 2,814 per thousand per annum. Only 165 individuals were affected, 112 of whom relapsed once, and 27 twice. Of the initial attacks 131 were due to *P. vivax*, 15 to *P. falciparum*, and 19 to mixed infection. *P. vivax* was found in all relapsing cases. Only one death occurred in the series; the patient had a spontaneous rupture of the spleen on the second day of his first relapse; the initial attack had been treated with quinine.

The first 240 cases were treated in rotation with either totaquine or quinine or atabrine, 80 cases with each. The doses of totaquine and of quinine employed were 1 gm. thrice daily after meals for two days, then 0·6 gm. thrice daily for five days. The doses of atabrine were 0·2 gm. every 6 hours for five doses, then 0·1 gm. thrice daily for six days. The composition of the totaquine used was:

	Per cent.
Cinchonine	26·9
Quinine	9·6
Cinchonidine	31·2
Quinidine	5·3
Anhydrous quinine	9·6
Total anhydrous crystallizable cinchona alkaloids	73·0

The average duration of persistence of parasites in the blood after the commencement of treatment was with totaquine 2·73 days, with quinine 2·53 days and with atabrine 2·25 days. The duration of fever was with totaquine 2·2 days, with quinine 2·25 days and with atabrine 2·7 days. The incidence of toxic symptoms caused by totaquine and quinine was about equal but the nausea and vomiting caused by totaquine were more disagreeable than any effects due to either quinine or atabrine. Of the cases treated with totaquine, 65 per cent. relapsed; with quinine, 70 per cent. and with atabrine 38·7 per cent.—all during the 11 weeks' period of observation. The period between initial attack and relapse was three times as long after atabrine treatment as it was after quinine or totaquine treatment. *Norman White.*

HEILIG, R. & VISVESWAR, S. K. **The Influence of Intravenous Injections of Quinine on the Myocardium.** *Indian Med. Gaz.* 1944, Nov., v. 79, No. 11, 514–18, 2 figs. on pl. No. 24. [27 refs.]

A review of the literature is given. RAO & NAIDU (*Quart. Bull. Mysore Med. Ass.*, 1943, v. 7, 105) found that clinical observation could detect no ill effects after single doses of quinine bihydrochloride not exceeding 10 grains, injected slowly in proper dilution. In the present investigations 24 patients with uncomplicated malaria were given a total dosage of 40 grains of quinine bihydrochloride divided into five intravenous injections (5, 7, 8, 10, 10 grains) on five consecutive days. Each dose was dissolved in 10 cc. of water. After the fifth injection, 14 patients (in eight of whom the electrocardiogram had previously been normal) showed definite signs of myocardial impairment; in six of them, the damage was considerable. [For the technical details, the original should be consulted.] Systolic and diastolic blood pressures were reduced by 10–15

mm. Hg. in all the patients after the third dose, but the reduction was not increased by subsequent doses. This diminution of blood pressure is believed to be due to an effect on the peripheral blood vessels. It is concluded that quinine should not be injected intravenously unless there is specific indication for this method of administration. *F. Hawking.*

HARNED, B. K. & ETTELDORF, J. N. **The Concomitant Administration of Sulfathiazole and Quinine or Atabrine.** *Amer. J. Med. Sci.* 1944, Dec., v. 208, No. 6, 750–56, 2 figs.

The effect of giving sulphathiazole simultaneously with mepacrine or quinine was investigated in 99 patients. The highest doses given were sulphathiazole 6 gm. daily for seven days; quinine bisulphate 2 gm. daily for seven days; and mepacrine 0·3 gm. daily for five days. With the possible exception of vomiting, these combinations of drugs did not cause any more adverse symptoms than those following any of the compounds separately. The combination of drugs produced no changes in the haemoglobin percentage or total white cell count of the blood. Quinine and mepacrine produced only minor changes in the free and total sulphathiazole in the blood and urine. *F. Hawking.*

BARLOW, O. W., AUERBACH, M. E. & RIVENBURG, H. **Studies of the Pharmacology of Atabrine on Mice, Rats, Ducks, and Dogs.** *J. Lab. & Clin. Med.* 1945, Jan., v. 30, No. 1, 20–31, 5 figs. [16 refs.]

Various useful chemical and physical data are given about eight salts of mepacrine (atabrine). In mice the LD50 of mepacrine dihydrochloride given by mouth is 0·706 gm. per kgm., and when given intravenously 0·02 gm. per kgm. Mepacrine was made by various combinations of American or German materials by American or German methods. When given by mouth to young rats the toxicity of the different preparations were indistinguishable (LD50 0·615–0·670 gm. per kgm). Similarly when given to dogs, the three different preparations used were indistinguishable in their effects. Twenty-five mgm. mepacrine per kgm. were given each day for three days and the dogs were killed on the fourth day. The average concentration of mepacrine dihydrochloride in the different organs was: heart 4·0 mgm. per 100 gm.; lungs 13·1 mgm.; liver 31·7 mgm.; spleen, 18·8 mgm.; and kidneys 7·9 mgm. Altogether 17 per cent. of the total dose was recovered. When fed in a mash to ducks, the American product was slightly less toxic than the products made from German intermediates. When a single dose of 675 mgm. per kgm. was given orally to rats, the concentration in the spleen was greatest at 24 hours afterwards (0·22 mgm. per gm.) and that in the liver at 8 hours (0·16 mgm. per gm.) In other experiments it was shown that a significant blood concentration was maintained in rats as long as mepacrine deposits existed in the liver.

In rats given daily 5 per cent. or less of the LD60, no pathological changes, were found in the viscera. But in rats given 10 per cent. or more of the LD60 there were large necrotic areas in the liver; the mepacrine content of these areas was not greater than that of the normal liver tissue. The kidneys, adrenals, spleen, and heart were enlarged and all the viscera were stained deep yellow. No significant changes occurred in the red blood cell or white blood cell counts or in the haemoglobin values. Mepacrine did not retard the growth of young rats unless the daily oral dose was at least 45 mgm. per kgm. *F. Hawking.*

LEWIS, R. A. **A Simple Method for estimating Serum Atabrine Concentration.** *J. Lab. & Clin. Med.* 1944, Dec., v. 29, No. 12, 1303–6.

Fifteen cubic centimetres of blood are placed in a 15 cc. centrifuge tube. After the blood has clotted, it is ringed with a glass rod and centrifuged for

fifteen minutes. The serum is decanted into a Wassermann tube and recentrifuged for five minutes. It is then placed in a 15 cc. centrifuge tube that has been calibrated at 5 and 11 cc. so that any excess serum may be pipetted off.

In similar tubes, 0·1, 0·2, 0·3, 0·5, 1·0, and 2·0 cc. of a 0·05 mgm. per 100 cc. solution of mepacrine (atabrine) are placed, to correspond to final dilutions of 0·001, 0·002, 0·003, 0·005, 0·010 and 0·020 mgm. per 100 cc. The 0·05 mgm. per 100 cc. solution is made up fresh each day by a fifty-fold dilution of the stock standard. The latter is made up from mepacrine dihydrochloride to a concentration of 2·5 mgm. per 100 cc., and kept in a dark bottle in a cool place.

To the unknown and standard solutions, 1 cc. of normal sodium hydroxide solution and 5 cc. of petroleum ether are added. The latter should be redistilled, the fraction boiling below 50 or over 70°C. being rejected. The tubes are corked with specially prepared rubber stoppers and shaken five times, first gently, then vigorously. The alkali and petroleum ether are added to six tubes which are then shaken and centrifuged for five minutes while the next six tubes are being prepared and shaken. A few drops of absolute ethyl alcohol are added to the layer which forms, and the tubes are again centrifuged for five minutes. It is helpful to agitate the gelatinous layer with a glass rod after adding the alcohol.

White stoppers were used to cork the serum-petroleum-ether mixture. It is necessary to soak them for fifteen minutes in petroleum ether and to boil them for fifteen minutes in a very dilute alkali several times. To reduce further chances of contamination from traces of wax pencil, the tubes were numbered and graduated with a diamond pencil.

A 4 cc. aliquot from each of the petroleum ether extracts is placed in a clean dry centrifuge tube, calibrated at 4 cc. for that purpose. Then 1 cc. of a saturated aqueous solution of chloral hydrate is added to each tube. Each tube is corked with a rubber stopper that has been wiped with chloral hydrate, and shaken briskly for one minute. One cork is sufficient for all the tubes if it is wiped carefully. The tubes are then centrifuged for five minutes and the petroleum ether suctioned off. The tubes are again centrifuged for five minutes, to clear the extract, which is then ready for reading. The unknown extracts are compared with the extracts of the standard solution by holding them near ultraviolet light, equipped with a Wood's glass filter, in a dark room. The whole method requires much care over details, to prevent contamination of the final extract with fluorescent materials from the reagents or apparatus.

[The concentration of mepacrine in white blood cells is about a thousand times that in the plasma; the concentration in the red blood corpuscles is about twice that in the plasma. Unless the cells are separated from the fluids of the blood by high speed centrifuging within 15 minutes of withdrawing the sample, an unknown proportion of the mepacrine in the white cells may be liberated into the plasma or serum, giving readings which are fallaciously high. Theoretically, the most significant thing to measure is the concentration of mepacrine in the plasma. If the apparatus (centrifuge and sensitive fluorimeter) for this is not available, it is best to measure the concentration in whole blood, making a total white cell count to guard against gross abnormalities in this respect. The concentration in whole blood is generally about four times that in the plasma. Estimation of the mepacrine concentration of the serum is not recommended, because of the error of liberation of unknown amounts of mepacrine from the white cells.] *F. Hawking.*

Bose, A. N., Ghosh, J. K. & Rakshit, P. C. **On the Efficacy of "Butyl Acridine" in the Treatment of Malaria. A Preliminary Note.** *Indian Med. Gaz.* 1944, Dec., v. 79, No. 12, 601–2.

A butyl-acridine derivative, 2-chloro-7-methoxy-5 (8-diethylamino butyl) aminoacridine, was tested on infections with *Plasmodium knowlesi* in *rhesus*

monkeys by SIDDONS and BOSE [this *Bulletin*, 1944, v. 41, 826] and was found to have a strong parasiticidal action. The corresponding amyl-acridine compound is atebrin [mepacrine]. The authors now record a trial of the butyl-acridine compound in human malaria.

Of the 27 cases of malaria, 22 were benign tertian and 5 were subtertian infections; the dose was 30 mgm. thrice daily for five consecutive days, and an alkali mixture containing sodium citrate and sodium bicarbonate was given at the same time. The drug was well borne, no untoward symptoms such as nausea, abdominal pain or headache, being observed, and the urine remained normal; there was a slight yellow staining of the conjunctiva.

Parasites disappeared within three days in all the cases and the fever subsided. In 10 of the 22 benign tertian infections a relapse occurred "between the second and third week"; patients who had no relapse within three months were regarded as cured. In the five subtertian infections, no relapse occurred during an observation period of six months; the drug had no apparent effect on crescents. [See also BOSE & RAKSHIT, p. 451.] *J. F. Corson.*

PARROT, L., CATANEI, A. & COLLIGNON, E. Nouveaux essais de prophylaxie collective du paludisme par les médicaments synthétiques (deuxième mémoire). [**New Trials of Mass Prophylaxis of Malaria with Synthetic Drugs.**] *Arch. Inst. Pasteur d'Algérie.* 1944, Sept., v. 22, No. 3, 179–246, 32 diagrams. [Refs. in footnotes.]

The observations recorded were designed to compare the efficacy of quinacrine and premaline S [mixture of quinacrine, 10 parts, and praequine, 1 part, *i.e.* atebrin and plasmoquine] in the prevention of malaria. They were made during the malaria seasons of 1942 and 1943 in the hyperendemic malaria region at the mouth of the Réghaïa wadi which was the scene of earlier trials comparing the relative prophylactic value of quinacrine and quinine [this *Bulletin*, 1944, v. 41, 539]. Two comparable groups, each composed of dwellers on either bank of the wadi in similar proportions, were selected for the experiment. Premaline S was not given to children below 5 years of age as no chocolate tablets of this preparation were procurable; they all received quinacrine. All drugs were given once a week. The dose of quinacrine given was from 0·15 to 0·30 gm. according to age, supplemented by praequine 0·015 to 0·03 gm. in the case of the premaline group. The campaign was interrupted in 1942, the drugs being administered only from June till mid-August. In 1943, the administration was continued throughout the period of malaria transmission, from May to November inclusive.

The observations are recorded with such a wealth of detail as precludes the possibility of adequate summary. The authors use several new indices as measures of the effect of the drugs. Gametimetric indices are analogous to the plasmodimetric indices previously described [this *Bulletin*, 1943, v. 40, 739]. The quotient of the division of the gamete index by the parasite index is the *rapport gamo-plasmodique*; the quotient of the division of the gametimetric index by the plasmodimetric index is the *rapport gamo-plasmodimétrique*.

As a prophylactic both methods of medication were alike ineffective. In both seasons outbreaks of malaria, mostly *P. falciparum*, occurred in both groups of the population undergoing treatment, and the "reservoir of virus" was greatly increased on both occasions. Gametocyte carriers were somewhat less numerous in the premaline S group than in the quinacrine group, especially in 1942, but the difference was not sufficient to influence the incidence of clinical malaria, which was comparable in both groups. No toxic reactions were noted with either drug. The results do not justify the use of premaline S in the mass prophylaxis of malaria among the natives of Algeria. *Norman White.*

HINDLE, J. A., ROSE, A. S., TREVETT, L. D. & PROUT, C. **The Effect of Penicillin on Inoculation Malaria. A Negative Report.** *New England J. of Med.* 1945, Feb. 1, v. 232, No. 5, 133–6, 3 figs.

" During investigations on the use of penicillin in neurosyphilis, 28 patients received both penicillin and benign tertian malaria. Fifteen of these had penicillin administered simultaneously with the malaria. Clinical charts of nine cases are presented. These charts graphically demonstrate that penicillin does not suppress fever or the parasite count of active inoculation malaria and that when given before or at the time of the malaria inoculation it does not prevent or postpone the development of fever and parasitemia.

" It is reasoned by analogy to known antimalarial drugs that since penicillin does not have an antimalarial effect on inoculation *Plasmodium vivax* malaria, it will not be effective in other types of malaria or in naturally acquired malaria.

" Since the writing of this paper we have had further experience in the use of penicillin in therapeutic malaria. In view of the fact that penicillin is rapidly removed from the body, we have tried more frequent injections to exclude this possible loophole in the ineffectiveness of the drug. We have given 3,000,000 units in five days at the rate of 50,000 units at each intramuscular injection every two hours, day and night. This method has been used in about 20 cases without any change in the paroxysms of fever or in the parasitemia."

BRADLEY, G. H. **The Entomological Phases of Malaria Control Programs.** *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Dec., v. 3, No. 4, 249–53.

The paper briefly summarizes the history of the attack on anophelines in the Northern American continent, starting from Howard's paper in 1900 on mosquitoes of the United States and coming up to the present time. The principle of " species-sanitation " was evolved in Panama in 1910, but did not receive general acceptance until 1937 when a number of boards of health employed entomologists. The need for skilled entomological advice became more apparent on the outbreak of the present war and a number of new appointments were made.

A brief account is given of the technique of organization of anopheline control, the determination of the locally important anopheline vectors, the methods of malaria survey, and the checking of control measures.

G. Macdonald.

STUBBS, T. H. **Educational Factors in the Ultimate Control of Malaria.** *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Dec., v. 3, No. 4, 255–9, 2 figs.

The efforts of health agencies to prevent malaria are impeded by various individual and public activities, such as agricultural customs, water impoundments for industry and commerce, and highway construction, and it is the place of education to remove these impediments. Funds for malaria prevention are a legitimate overhead expense of enterprise, and will become more so as malaria declines and becomes a potential rather than an actual risk, when the money from public funds to prevent its recrudescence will inevitably decrease, and it is the greatest educational task of the malariologist to translate this abstract statement into practical action. Education in the form of professional and technical training, as well as public education through regular channels and the supply of information to the public, can convert those agencies which have acted as impediments into assistants in the campaign.

G. Macdonald.

GARNHAM, P. C. C. & HARPER, J. O. **The Control of Rural Malaria by Pyrethrum Dusting.** *East African Med. J.* 1944, Oct., v. 21, No. 10, 310–20, 1 fig.

The experiment described was carried out in two villages, Ivona and Igunga, in the Maragoli District of North Kavirondo, in the Nyanza Province of Kenya. The villages are about a mile apart and separated by a valley. Maragoli is on the Equator, some 5,000 feet above sea level. It is densely populated, over 500 to the square mile, by a tribe of the Bantu group, which has a fair degree of natural resistance to malaria. The dwellings are the usual round, single-roomed, mud-and-pole structures with thatched roofs. The hut is sometimes subdivided, stocks being kept in one half. Smoke-grimed walls, from fires constantly smouldering, and the absence of windows, make the interiors dark. Epidemics of *falciparum* malaria occur in the "long rains"; at other seasons only occasional infections occur. *P. malariae* infections occur; *P. vivax* is rare.

Fifty huts in each of the two villages were selected. Those in Igunga were dusted with pyrethrum powder twice a week; the Ivona huts acted as a control. The powder was blown from a distributor and directed chiefly towards the roof. From April to October 1942 the amount of powder used was 1 ounce per 1,000 cubic feet; from November 1942 to August 1943 the amount was doubled. The smaller dose had little effect. The use of the larger dose was followed by a fall in the parasite rate of children, whereas the rate increased in the control village. The dusting appeared to cause a 50 per cent. reduction in the incidence of malaria. No other control measures were employed. Quartan malaria was present throughout the year and at all ages in about 10 per cent. of the children examined. *P. vivax* was found only in August. *P. falciparum* infections increased in June to reach a maximum in August.

A "Haddow hut" was constructed in each village and searched daily for mosquitoes. Ten ordinary untreated huts in each village were also searched twice a week. The two vector species *A. gambiae* and *A. funestus* were four or five times more numerous in the treated than in the untreated village. The *A. gambiae* season begins first with the long rains and is overtaken three months later by *A. funestus* and later still by *A. marshalli*. *A. funestus* was practically absent in 1943, as in many other parts of Kenya that year. *A. marshalli* was a common domestic mosquito but does not appear to be a malaria vector; no sporozoites were found in 485 dissected at a season when the *A. funestus* sporozoite rate was 2 per cent. Of other mosquitoes found in huts, were small numbers of the following *Aëdes* species: *A. aegypti*, *A. metallicus*, *A. africanus*, *A. longipalpis* and *A. ingrami*, the last three being tree-hole breeders.

A microfilaria was found in the blood of 18 per cent. of the children. Its vector appeared to be *Culicoides trichopis* and its morphology resembled that of *Acanthocheilonema perstans*. *Norman White.*

HÜHNE, W. Malariasanierung in Chalkis. Ein Beispiel für die Spätsommer-Sanierung der Anophelenbrutplätze in einer von deutschen Truppen besetzten griechischen Stadt. [**Malaria Control in Chalcis (Greece).**] *Deut. Militärarzt.* 1943, July, v. 8, No. 7, 371–6, 7 figs.

A survey of mosquito breeding grounds in and round Chalcis is described in general terms; the paper is well illustrated by seven maps.

The intention of the author obviously is to call the attention of his fellow medical officers to the possibility of carrying out larval control in certain regions under military occupation. He points out that in the German army chief reliance is placed on "drug prophylaxis," whereas the British have attached a good deal of importance to mosquito-control measures.

Paris green is stated to have been used, but little other information is given with regard to the methods or results of the control measures.

John W. D. Megaw.

ALVARADO, C. A. & PEÑA, L. S. Aplicación de sifones antilarvarios en la República Argentina. [**The Use of Anti-larval Siphons in Argentina.**] *Bol. Oficina Sanitaria Panamericana.* 1944, Oct., v. 23, No. 10, 876–86, 6 figs.

PATEL, B. V. **Thiazole Derivatives of Sulphanilamide in Monkey Malaria.** *Quart. J. Pharm. & Pharmacol.* 1944, Oct.-Dec., v. 17, No. 4, 297–301. [13 refs.]

Numerous reports have appeared on the activity of sulphonamides in simian malaria [this *Bulletin*, 1938, v. 35, 897 and 900 ; 1939, v. 36, 824 and 1012, and subsequently]. The present investigation deals with the therapeutic effect of three thiazole derivatives on *P. knowlesi* infections in *rhesus* monkeys: I, N^1-methyl-sulphathiazole; II, 2-N^1-sulphanilamido-5-ethylthiazole; and III, 2-N^1-sulphanilamido-5-*iso*propylthiazole. In all, 12 monkeys weighing between 2½ and 3½ kgm. were treated. The drugs were given orally by stomach tube in tragacanth suspension, in doses of 0·5 or 1·0 gm. Sometimes only a single dose, and not more than a total of five, were given, dosage being carried out once or twice a day. If parasites disappeared from the blood and were absent for more than three weeks, the usual tests for radical cure were carried out. The concentrations of each drug in the free and conjugated form in the blood were determined, and were very low in the case of uncombined drug, rarely exceeding 2·0 mgm. per cent. Toxic symptoms were not noted in the animals. Relapses occurred with drug I after a total dosage of 2 gm. In the case of drug II, a dose of 0·5 gm. caused the parasites to disappear temporarily, and radical cures were effected in two monkeys which received 2·0 and 5·0 gm. respectively. Four monkeys treated with drug III in doses of from 0·5–3·0 gm. were all radically cured. *J. D. Fulton.*

SILVERMAN, M., CEITHAML, J., TALIAFERRO, L. G. & EVANS, E. A., Jr. **The in Vitro Metabolism of** *Plasmodium gallinaceum.* *J. Infect. Dis.* 1944, Nov.-Dec., v. 75, No. 3, 212–30, 7 figs. [Refs. in footnotes.]

Following the experiments of CHRISTOPHERS and FULTON [this *Bulletin*, 1938, v. 35, 709 and 711 ; 1940, v. 37, 190 and 509], on the respiratory metabolism of *P. knowlesi*, reports by other workers in this field have appeared [this *Bulletin*, 1942, v. 39, 397 and 742 ; 1943, v. 40, 674]. The object of the present investigation was to study the metabolic characters of *P. gallinaceum* and to relate them to the effects of antimalarial drugs. Since the presence of the nucleated red cells of chickens is an added complication in interpreting results, suitable controls have been used throughout the experiments, which, for simplicity, have been carried out in buffered Ca-free phosphate saline aerobically, and in Ca-free bicarbonate saline anaerobically, in the absence of plasma. The manometric measurements were made at 40°C. Before withdrawal of the parasitized blood from chickens by cardiac puncture, counts were made of the cells present, including reticulocytes in smears of blood from the saphenous vein. The drawn blood was citrated, and after dilution in the appropriate buffer, the cells were washed twice in the same medium, resuspended, and the cells again counted. It was shown that different oxygen tensions had little effect on respiration. A direct correlation was found between parasitic surface area and metabolic activity in this asynchronous infection. Based on surface area, it was found that parasite respiration and glucose utilization was about seventy times that of normal red cells. The R.Q. of normal red cells was approximately 1, they formed lactic acid, and the carbon balance was in agreement with the glucose used. In the case of parasitized cells, the value of the R.Q. was nearly the same, but the carbon balance suggested that some product other than CO_2 and lactic acid was being formed, besides the traces of pyruvic and succinic acids detected.

The parasite can apparently oxidize lactate and pyruvate completely. At *p*H 7·8, parasite respiration was greatest. In order to find out if CO_2 was assimilated by the parasite (a fact established for a number of microorganisms in recent years) a tracer method was used with sodium bicarbonate as the source of radioactive carbon. With glucose as substrate, the result in one of four experiments was positive. In the case of parasitized cells, CO_2 and lactic acid were formed from glucose anaerobically.

During the *in vitro* experiments with quinine, the distribution of this substance between normal and infected red cells was determined. It was much higher than occurs *in vivo* after administration of the drug, and is probably accounted for by the absence of plasma. Inhibition of respiration in parasitized cells at very low concentrations of quinine was greater than occurs with normal cells. When the quinine concentration in the medium was greater than that obtained in the blood of chickens following effective therapeutic treatment of *P. gallinaceum* infections, respiration and both the aerobic and anaerobic glycolysis of parasitized cells were inhibited to about the same extent ; the effect on respiration was more marked with lactate or pyruvate as substrates. A useful comparative study showed that quinine also inhibited the formation of lactic acid from glycogen by muscle extracts, in which the reactions involved are well known, and the results should be of value regarding the mechanism of action of quinine. At concentrations of the drug within the range attained in effective therapeutic treatment in the same infection, it was found that respiration was depressed, the glucose utilization was normal, while there was increased formation of lactic acid. The degradation product of quinine obtained by KELSEY *et al.* [this *Bulletin*, 1944, v. 41, 923] was as effective as the parent substance in inhibiting *in vitro* respiration, but affected aerobic and anaerobic glycolysis to a lesser degree.

J. D. Fulton.

TALIAFERRO, Lucy G., COULSTON, F. & SILVERMAN, M. **The Antimalarial Activity of Tyrothricin against** *Plasmodium gallinaceum.* *J. Infect. Dis.*, 1944, Nov.–Dec., v. 75, no. 3, 179–211, 10 figs. [34 refs.]

The paper is notable as much for the wealth of observations recorded as for the results obtained in *P. gallinaceum* infection of chickens with a new type of antimalarial which is however very toxic. DUBOS (*Proc. Soc. Exp. Biol. & Med.*, 1939, v. 40, 311) described the bactericidal effect of an alcohol-soluble, water-insoluble extract of a soil bacillus on Gram-positive cocci. From the crude product tyrothricin, crystalline neutral gramicidin and tyrocidine hydrochloride, the crystalline salt of a weak base, were later separated by HOTCHKISS & DUBOS (*J. Biol. Chem.*, 1940, v. 136, 803) [see also *Bulletin of Hygiene*, 1939, v. 14, 886 ; 1940, v. 15, 733 ; 1941, v. 16, 650].

In the present experiments the crude product tyrothricin has been tested on *P. gallinaceum* infections of chickens, and the results compared with those obtained with quinine. A few tests were also carried out with gramicidin. White Leghorn chicks were used, ranging in age from 10 days to four weeks, and were kept alternately in light and dark for periods of twelve hours at a time. The doses recorded below refer to the amounts administered per 100 gm. weight, and during the experiment re-weighing was carried out every three days. A few infections were induced by the bites of infected *Aëdes aegypti* mosquitoes, and all others by inoculation of parasitized blood within half an hour of its withdrawal, as parasites survived badly after that time. Daily blood smears were made at 9 a.m., to study the course of infection, and at 8 a.m., 2, 8, and 12 p.m. each day when the effect of the drug was being observed. The asexual cycle was followed by counting six classes of parasites, ranging from the youngest forms to segmenters, four times during the day as above. By counting all

parasites with two or more nuclei, which formed a fair percentage of the population, a good indication of the periodicity was obtained. The percentage of degenerate forms of various classes of parasite was also estimated in studying the effect of each drug on the asexual cycle.

Tyrothricin was prepared in 2 per cent. solution in 95 per cent. alcohol, and suitably diluted with distilled water before use. The drug was effective only when given intravenously, but oral and intraperitoneal administration was also tried. Quinine was given orally and intravenously as the dihydrochloride. In doses approaching the maximum tolerated, tyrothricin caused respiratory failure in chickens, and was much more toxic than quinine. Doses of 0·2 mgm. per 100 gm. were tolerated intravenously daily for 15 days; single doses of 0·6 mgm. were lethal. Its activity was compared with that of quinine when the latter was given orally and intravenously in sporozoite as well as in blood-induced infections. The effect was additive when tyrothricin was given intravenously along with quinine given orally in blood-induced infections. The inhibitory effect of both drugs on *P. gallinaceum* respiration *in vitro* was also measured.

It was found that continued treatment with 0·2 mgm. of tyrothricin was as effective as with 16–24 mgm. of quinine orally, in sporozoite-induced infections, if treatment was started on the day of infection, or on the first day of appearance of parasites. The parasite number was markedly reduced, but infection or relapses were not prevented, nor was the incubation period shortened. The drug was apparently not effective against sporozoites or cryptozoites, and, with a certain dosage, fatal relapses, accompanied by the presence of exoerythrocytic forms, occurred. In blood-induced infections, the same dosage of tyrothricin was more effective, and prolonged the incubation period. When larger doses of tyrothricin were given over a shorter period, the results were not so satisfactory.

A study of the normal course of the asexual cycle, in general, confirmed the results of earlier workers. The number of merozoites per segmenter varied from 6 to 36. Atypical forms were present at the time of crisis. The effect of both drugs on the parasite and on the asexual cycle was observed when treatment was started at the early trophozoite stage. Tyrothricin prolonged the cycle from the normal 36 to 48 hours, and rendered it less synchronous. Twenty-four hours after the start of treatment, degenerate multinucleate stages were noted. The larger trophozoites and fully developed schizonts were affected more than very young forms or gametocytes [*cf.* the results obtained by HEWITT & RICHARDSON (this *Bulletin*, 1944, v. 41, 188) in *P. lophurae* infections of chickens with other drugs, including quinine]. The effects of this drug on different stages of the parasite are recorded in detail, and non-parasitized cells were also affected. Observations were made in the same way following quinine treatment. It appears that tyrothricin does not affect reproduction of the parasites so markedly as quinine, its effect being predominantly parasiticidal on extracellular merozoites, while quinine predominantly inhibits reproduction. Both drugs are, nevertheless, about equally active in controlling the infection. When the activity of the drugs, given intravenously, was compared in sporozoite- and blood-induced infections by starting treatment at different periods during the infection, it was found that 0·75 mgm. quinine was equal to 0·2 mgm. tyrothricin (quinine equivalent approximately 4). On a weight basis, tyrothricin inhibited respiration of *P. gallinaceum* more effectively *in vitro* than did quinine, and caused haemolysis of red cells, while the latter did not. The markedly curative and suppressive activity of tyrothricin in this infection was paralleled by gramicidin, which, when given in doses of 0·4 mgm. daily for 12 days, greatly reduced the number of parasites following blood-induced infections.

J. D. Fulton.

BOSE, A. N. & RAKSHIT, P. **The Effect of certain Substituted Quinoline and Acridine Compounds on the Gametocytes of** *Haemoproteus columbae.* *Quart. J. Pharm. & Pharmacol.* 1944, Oct.–Dec., v. 17, No. 4, 319–22, 1 fig. [12 refs.]

An investigation of the activities of certain substituted quinoline and acridine compounds against the gametocytes of naturally acquired *Haemoproteus columbae* infections of pigeons, has been carried out with the following compounds :—

I. 6-methoxy-8-(γ-diethylaminopropyl) aminoquinoline in the form of its methylene-*bis*-salicylic acid salt.
II. 2-chloro-7-methoxy-5-(δ-diethylaminobutyl) aminoacridine in the form of its hydrochloride.
III. 2-diethylsulphonamido-7-methoxy-5-(ω-diethylamino*iso*amyl) aminoacridine.
IV. 2-diethylsulphonamido-7-methoxy-5-(δdiethylaminobutyl) aminoacridine.
V. 4-aminobenzenesulphon-6′-methoxy-8′-quinolylamide.

Compound II had already proved very active in *P. knowlesi* infections of monkeys [this *Bulletin*, 1944, v. 41, 826]. Six pigeons each weighing 300–350 gm. were treated with varying doses of each drug. They were kept in separate screened cages after being cleansed by pyrethrum soap. Five pigeons were used as controls. The blood of each bird was regularly examined, and gametocytes counted for 7 days before treatment began. The number of infected red cells varied from 1 to 11 per cent. All drugs were given orally in glucose solution, and in varied doses, once each day, for five consecutive days. The blood examinations were continued for four weeks or longer after the start of treatment. In the case of drug I, doses ranged from 0·5 to 10 mgm.; it was effective but relapses occurred ; drug II in doses of 1–10 mgm. also had some action in causing parasites to disappear ; drugs III and IV in 10 to 25 mgm. doses had only a slight action ; drug V in 10 to 25 mgm. doses had no effect on gametocytes. The authors consider that the method may have some useful applications [see COATNEY, this *Bulletin*, 1936, v. 33, 238]. In the case of effective drugs the results were clear-cut. Gametocidal effect is not permanent with any of them, and is lowered when a sulphonamide group replaces chlorine in the acridine ring, and also when the alkylamino side chain in the quinoline molecule is replaced by a sulphanilyl group. *J. D. Fulton.*

BLACKWATER FEVER.

SKIPPER, E. W., & HAINE, G. L. **Blackwater Fever in West Africa.** *Brit. Med. J.*, 1945, Mar. 10, 325–7. [19 refs.]

Seven cases of blackwater fever occurring in the West African command are described. The authors give an account of the cases because " it is felt that this disease is of special importance while British and Allied troops are living and fighting in countries in which it occurs, and because it is not very rare for individuals to develop it after return to the United Kingdom from the Tropics."

The descriptions of cases are disappointingly short, and the tables would have been improved if they had contained more information, especially regarding urine volume and urinary reaction.

The relation of blackwater fever to malaria and anti-malarial drugs is briefly discussed, and FINDLAY (personal communication, 1944) is quoted as stating

that " the incidence of blackwater fever in the West African Command has considerably diminished since the substitution of mepacrine for quinine as a suppressive and as the therapeutic drug for uncomplicated malaria."

The possible mechanisms of haemolysis in blackwater fever are discussed without reference to a good deal of the literature on the subject [for example, PONDER, *J. Gen. Phys.*, 1944, v. 27, 483 ; OLIVER-GONZALEZ [this *Bulletin*, 1945, v. 42, p. 353] ; FOY and KONDI [*ibid.*, 1943, v. 40, 883].

The authors state in their summary that " evidence is produced to show that alkalis are probably of value in preventing anuria." This statement is no doubt based partly on the fact that all seven of the reported cases recovered and only one developed anuria. The authors make a plea for the early use of alkali, but are not very clear about the reason for its use, beyond stating baldly that " in blackwater fever an acidosis is usually present," a statement which is not borne out by the very little work that has been done on this subject. The advice given concerning fluid intake includes no mention of limitation of intake in conditions of oliguria and anuria ; a word of warning such as that recently expressed by PARAMORE [below] should have been added here, since it is so very easy to waterlog a patient who is not getting rid of fluid through his kidneys.

It is not clear from the text why the authors state that " blood [transfusion] should never be given if oliguria is present." Such advice is apparently based on the possibility of haemolysis of the donor's cells and indicates that the authors are concerned mainly with the possible effects of haemoglobin and its products on renal function, and not so much with the necessity of providing blood cells for the carriage of oxygen to vital tissues.

[There is a mistake in the second paragraph of the paper, where it is stated that methaemoglobin is never excreted. It is presumed that the authors were referring to methaemalbumin, as they state in the preceding sentence that oxyhaemoglobin and methaemoglobin are excreted in the urine.]

B. G. Maegraith.

PARAMORE, R. H. **Traumatic Anuria.** [Correspondence.] *Lancet.* 1945, Mar. 10, 323.

Referring to the fatal case of traumatic anuria reported by CAPLAN and DUNKERLY [see *Bulletin of Hygiene*, 1945, v. 42, 331], in which large quantities of fluid were given, the author states that the condition of the kidneys found post mortem in that case is not unique, but is common to all cases of anuria, even in soldiers wounded by high-explosive missiles, as reported by DARMADY *et al.* [*Bulletin of War Med.*, 1945, v. 5, 482]. He warns against the pressing of fluids in cases of anuria and suggests that the time may come when clinicians will restrict the application of some of the methods—transfusion, ice-packs to damaged limbs, the horizontal position—which are in favour today. [The author expresses his inability to go deeply into the question in a letter and does not support his views on the treatment of shock and anuria with records of cases.]

J. F. Corson.

TRYPANOSOMIASIS.

FAIRBAIRN, H. **Sleeping Sickness in Tanganyika.** *Tanganyika Territory Medical Department Medical Pamphlet No. 40.* 8 pp., 1 map. 1944. Dar-es Salaam: Govt. Printer.

In this pamphlet the author gives a short account of the main features of Rhodesian sleeping sickness, with many practical hints on diagnosis, prognosis and treatment based on much experience in Tanganyika Territory.

He regards *Trypanosoma brucei* and *T. rhodesiense* as distinct species and holds the view that animals, especially game, are reservoirs of *T. rhodesiense* in nature, as they have been shown capable of being in experimental work.

Diagnosis can always be made by blood examination, and gland puncture is unnecessary, but in some advanced cases it is more quickly made by lumbar puncture.

Prognosis [especially in natives who cannot give accurate histories] depends greatly on the protein content of the cerebrospinal fluid over a period of some months. A cell count of 7 per cmm. should not be considered abnormal in cured early cases. The upper normal limit of protein [Sicard and Canteloube tube method ?] is 0·025 per cent. ; if it is not above 0·03 per cent. the case is an early one of not more than six weeks' duration, and can be cured with suramin [germanin] alone. If the protein is between 0·03 and 0·035 per cent., a full course of tryparsamide should follow the course of suramin, while if the protein is 0·04 per cent. or more, the case is a late one and most probably incurable.

There is little danger in making a lumbar puncture before treatment is given [this refers, of course, to the risk of pricking a vein while trypanosomes are present in the blood] ; the Howard Jones needle, which has a small bore, and is tough and made of stainless steel, is recommended. The Sicard and Canteloube tube, in which trichloracetic acid is used to precipitate the protein, is recommended for the estimation of protein in the cerebrospinal fluid.

Treatment.—Injections of suramin should not be discontinued on account of the occurrence of albuminuria ; it will not increase and will unusually clear up within a month after the course of injections. At the end of the course of suramin a lumbar puncture should be made, repeated a month later, and afterwards at intervals judged to be necessary.

Vision should be tested (by picking a pin from the table) before each dose of tryparsamide ; if it is impaired, tryparsamide should not be given. Children bear tryparsamide badly and the dose in grammes should be one-twentieth of the age in years.

Repeated courses of tryparsamide should not be given in relapsed cases ; besides the risk of producing optic atrophy, there is the danger of making the trypanosomes arsenic-fast. Relapsed cases should be treated by monthly injections of 1 gm. of suramin to sterilize the peripheral blood.

Prophylactic injections of suramin.—The author believes that the risk of so-called " cryptic " infections is a real one, and thinks it is preferable for an individual to get a definite attack that can be easily diagnosed and treated than a " cryptic " attack, even if the chance of getting the latter may be smaller in the circumstances. *J. F. Corson.*

NEGHME, A. **Penicillin Sodium Treatment of Experimental Trypanosomiasis of Mice.** *Science.* 1945, Feb. 2, 115.

The work was done on a few mice infected with *Trypanosoma cruzi* ; no beneficial effect was observed.

GASCHEN, H. [Dr. ès Sciences chef de travaux à l'Institut d'Hygiène Lausanne (Suisse).] Les Glossines de l'Afrique Occidentale Française. [**The Tsetse Flies of French West Africa.**] *Acta Tropica.* Basel. 1945, Suppl. 2, 131 pp., 114 figs. & 1 folding pl. [Bibliography.]

This book is reviewed on p. 512.

KUBES, Vladimir [D.M.V., Director del Instituto de Investigaciones Veterinarias]. El *Trypanosoma vivax* Americano, agente de la Tripanosomiasis Bovina en Venezuela, su Comparación con el del Africa. [**American** *T. vivax*, **the Causative Agent of Bovine Trypanosomiasis in Venezuela ; Comparison with that in Africa.**] *3a Conferencia Interamericana de Agricultura, Caracas, No. 1.* Caracas. 1944. pp. xi+124, 20 figs., 10 tables & charts. [85 refs.] [In Spanish : English summary pp. 111–117.]

This book was reviewed on p. 422.

LEISHMANIASIS.

ROSE, H. M. **Cold Hemagglutinins in Visceral Leishmaniasis (Kala-Azar).** *Proc. Soc. Exper. Biol. & Med.* 1945, Jan., v. 58, No. 1, 93–4.

"Cold agglutinins in high titers were demonstrated in the blood of two patients suffering from visceral leishmaniasis. In one of these patients, who was followed for several months, the agglutinins returned to within normal limits after recovery."

BAKHRAMI, D. A. [**Culture of** *Leishmania tropica* **in Chick Embryo.**] *Doklady Akademii Nauk U.S.S.R.*[=*C.R. Acad. Sci. USSR.*] Moscow. 1943, N.S., v. 40, No. 5, 236. [In Russian.]

The author describes a method for cultivating *Leishmania tropica* in the chick embryo. The eggs are first incubated for six days at 39°C., after which two holes are bored in the egg, one leading to the air-sac, and the other to the embryo. After the leishmania (cultural forms or L.D. bodies from sores) are introduced through the second hole, both openings are sealed with paraffin wax, and the eggs are incubated at 25°C. Three days later leishmania can be found in large numbers in the chorioallantois and in the embryo itself, in which they assume the leptomonad stage and other forms similar to those which develop in cultures on artificial media. *C. A. Hoare.*

KOJEVNIKOVA, E. V. [**Localization of Cutaneous Leishmaniasis according to its Type.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 2, 88–9. [In Russian.]

As is known, the lesions of cutaneous leishmaniasis are usually formed on the exposed parts of the body. Though their localization may vary, in the published accounts of some observers the site most commonly affected is said to be the face, while in those of others it is the limbs. A comparison of the literary data has convinced the author that the former were dealing with cases of the "dry," late ulcerating type, while the latter were dealing with cases of the "moist," early ulcerating type [see this *Bulletin*, 1944, v. 41, 331]. The author herself examined from this point of view 3,125 case histories of oriental sore, of which 1,620 were of the "dry" type and 1,505 of the "moist" type. This study fully confirmed the conclusions based on the works of previous authors, for it was found that in the "moist" type the great majority of lesions were restricted to the extremities, whereas in the "dry" type the face was mainly affected. *C. A. Hoare.*

KLITZNER, H. Ueber die therapeutische Beeinflussbarkeit der Hautleishmaniosen durch Sulfonamide. [**The Treatment of Oriental Sore with Sulphonamide.**] *Deut. Militärarzt.* 1943, Aug., v. 8, No. 8, 472–4, 4 figs.

Having in his care three cases of oriental sore in soldiers who had served in N. Africa, the author treated them by administering "Albucid" [sulphacetamide], by the mouth and applying to the sores an ointment containing the same drug. Healing of the sores took place in periods up to 48 days. Though he recognises that a sulphonamide may aid the healing of oriental sore by getting rid of secondary bacterial infections, he still thinks that the drug may have some specific action. He does not say how long the sores had been in existence when treatment was initiated nor whether spontaneous healing had already commenced. *C. M. Wenyon.*

FEVERS OF THE TYPHUS GROUP.

ELFORD, W. J. & VAN DEN ENDE, M. **Studies on the Viability and Filterability of Typhus Rickettsiae.** *Brit. J. Exper. Path.* 1944, Dec., v. 25, No. 6, 213–20.

This paper deals with the results of investigations undertaken as an essential preliminary to a more comprehensive programme of typhus research. It must be read in the original form by workers engaged on similar enquiries, but some of the findings of general interest are as follows.

Suspensions of murine rickettsiae were found to retain their viability for a longer time when diluted with serum broth than when other media were employed. The paper by ANDERSON [this *Bulletin*, 1945, v. 42, 106] who found skim milk the best of the media tested by him, came to hand after this paper had been sent for publication.

Suspensions in serum broth best retained their viability when the *p*H of the medium was between 6 and 8·5.

At −77°C. the viability of suspensions in serum broth *p*H 7·6 remained unimpaired for many days. At higher temperatures, from −10°C. and upwards, it was soon lost.

By filtration tests through membranes of the "gradocol" series it was found that suspensions of murine and two epidemic strains passed through membrane 700 millimicron, but not through one of 500 millimicron pore size. Even with the 2,300 millimicron clearing membrane there was a reduction in the titre of infectivity, and this reduction progressively increased with the use of smaller pore membranes and was considerable when membrane 700 millimicron was used. The authors consider that the smallest phase of the pleomorphic rickettsiae was unlikely to be less than 0·4 to 0·5μ in diameter or width.

Estimations of the size of the organisms based on photographs of moist preparations of rickettsiae taken by ultraviolet light were made. The width was relatively uniformly 0·45μ and the length varied from 0·6 to 1·8μ. Photographs taken with the electron microscope gave similar results when allowance was made for shrinkage due to drying of the film. This was found to be 25–33 per cent. *John W. D. Megaw.*

OSBURN, L. W. **Alum-precipitated Typhus Vaccine: South African Epidemic Typhus Vaccine prepared from Gerbils (Genus Tatera).** *South Africa J. Med. Sci.* 1944, Nov., v. 9, No. 4, 143–9. [13 refs.]

Gerbils (*Tatera afra* and *T. brantsi*) were exposed to an X-ray dose of 600 R. and afterwards inoculated intraperitoneally with 1·0 cc. of a yolk-sac suspension

of *Rickettsia prowazeki* estimated to contain about two billion organisms per cc. [presumably 2,000,000,000,000].

The animals became moribund within 48 to 72 hours and were then killed. [This rapid effect suggests the action of a very large dose of exotoxin.]

Peritoneal washings, after treatment described in the paper, were precipitated with alum, and a vaccine was prepared. After preliminary tests on guineapigs the dose selected for experiments in protection was 1·0 cc. estimated to contain one billion rickettsiae.

On a basis of a series of comparative tests, the author concluded that the alum-precipitated vaccine conferred better immunity than the non-precipitated vaccine of the same strength against South African and European strains of typhus rickettsiae. The results of the various tests, taken together and expressed in percentages, would bear out this claim ; the precipitated vaccine conferred complete immunity on 68 per cent. of guineapigs, and the non-precipitated protected only 37 per cent. when given in a single dose in three sets of tests.

But the results in different lots of guineapigs appear to have been very variable. From the figures given in the tables the reviewer has extracted the following :—

	Protection (one dose precipitated vaccine)			Protection (three doses ordinary vaccine)		
	Complete	Partial	None	Complete	Partial	None
Table II ...	8	2	5	4	0	8
Table III ...	8	0	0	10	0	0
Table IV ...	20	0	0	40	8	9

Similar variations occurred in the results of the tests with single doses of non-precipitated vaccine ; of one lot of 15 guineapigs, no less than 11 remained completely unprotected ; yet in three other lots, totalling 20 animals, all were completely protected.

The figures given in Table IV of the paper show the results of tests of protection against four European strains of epidemic typhus. In the case of each strain three lots of guineapigs were vaccinated with one, two, and three doses respectively of non-precipitated vaccine, with the anomalous result that a single dose gave complete protection to 16 out of 19 animals ; two doses gave similar protection to 15 out of 19 ; and three doses to 40 out of 57. In the other series of experiments, three doses of this vaccine gave complete protection to 70 per cent. of the animals tested, whereas one dose gave similar protection to only 37 per cent.

Although these unexplained variations must be taken into account in assessing the significance of the findings, it is evident that with the vaccines used by the author the balance of advantage rested with the alum-precipitated preparations.

John W. D. Megaw.

FAIERSTEIN, S. G. [**Efficacy of Anti-Typhus Vaccination in Moscow Railway Workers.**] *Gigiena i Sanitariya.* Moscow. 1944, No. 10–11, 34–9. [In Russian.]

A formalinized suspension of lungs of mice with rickettsial pneumonia was used as vaccine. Each member of the personnel of all railway stations in Moscow was given three injections of 0·5–1 cc., at intervals of 5 to 10 days ; in all 6,316 people were vaccinated while 4,484 served as unvaccinated controls.

All subjects were observed for nine months. Reactions occurred in a small proportion of cases (local 5 per cent., general 9 per cent., rise of temperature 5 per cent.).

Seven cases of typhus occurred in the vaccinated group during the period of observation (=11 per 10,000). Two were mild, occurring one month after the last injection, 4 moderate, occurring up to 4½ months, and one fatal, after 4½ months.

In the control group 18 cases occurred (40 per 10,000), one mild, six moderate and 11 severe, of which two were fatal. *D. J. Bauer.*

CASTANEDA, M. RUIZ, & SILVA, R. **Simultaneous Infection of Laboratory Animals with Murine and Classic Typhus. Immunological Results.** *Proc. Soc. Exper. Biol. & Med.* 1944, Oct., v. 57, No. 1, 80–82.

The authors found that mice inoculated intranasally with mixtures of murine and classical rickettsiae died, within 48 hours, of generalized pneumonia. Intranasal transfers from mouse to mouse were made for 13 passages and then failed because of secondary infection. There was evidence, which will be presented in a later paper, that both types of rickettsiae persisted for 10 passages.

Rats infected in the same way died of pneumonia in 72–96 hours, but transfers failed after two passages because of secondary infection. From the lungs of rats infected in this way saline suspensions were prepared and were injected into guineapigs by the intradermal route. The sera of the guineapigs were subjected, 20 days later, to complement-fixation tests in which classic, murine, and bivalent rickettsiae, respectively, were used as antigens ; a response of 4+ at a titre of 1–80 was obtained with all three antigens ; the response at a titre of 1–160 was 2+ with classic antigen, 3+ with murine, and 1+ with the bivalent antigen. From these tests, combined with comparative tests on the sera of guineapigs inoculated intradermally with monovalent murine and classic rickettsiae, the authors conclude that the bivalent antigen acts as a mixture of murine and classic rickettsiae.

Vaccine prepared from the lungs of rats infected intranasally with mixtures of murine and classic rickettsiae gave a better degree of protection to guineapigs inoculated with classic rickettsiae than vaccines prepared from murine rickettsiae alone ; the authors conclude that classic rickettsiae multiply more readily in rats when the inoculum contains murine rickettsiae in addition.

The experiments are regarded as furnishing evidence of the superiority of bivalent rat-lung vaccines over rat-lung vaccines prepared from murine strains only. *John W. D. Megaw.*

TOPPING, N. H. & SHEAR, M. J. **Studies of Antigens in Infected Yolk Sacs.** *Pub. Health Rep.* Wash. 1944, Dec. 29, v. 59, No. 52, 1671–5.

Suspensions of epidemic-typhus rickettsiae grown in yolk sacs were treated with ether and centrifuged. The resultant supernatant fluid was found to contain a substance, provisionally described as "soluble," which had the same immunological properties as the rickettsial sediment.

The material used for testing the supernatant fluid was prepared by certain modifications of an ether-treatment method already employed by CRAIGIE, who described his technique to the authors in a personal communication.

The authors' method was to grind infected yolk sacs with alundum, dilute them with saline containing 0·5 per cent. formalin to make a 10 per cent. suspension, add an equal volume of ether, shake and allow to stand for 1–1½ hours ; then apply "repeated extraction of the aqueous phase (either once or twice) until the excess ether is colourless." The ether was removed at room

temperature under reduced pressure. The suspension was centrifuged at 4,000 r.p.m. for an hour, and the sediment was resuspended in saline to the origina volume.

The supernatant fluid and the rickettsial suspension were separately tested for their power to fix complement in the presence of immune guineapig serum. In each of the two comparative tests given as examples the complement-fixation titre of the supernatant fluid was greater than that of the rickettsial suspension ; the respective titres in one test were 1–128 and 1–64, in the other they were 1–64 and 1–32.

The supernatant fluid, after centrifugation at 15,000 r.p.m., lost little of its complement-fixation power, and the sediment resulting from this process contained no complement-fixing antigen.

The sample of supernatant fluid which originally had a complement-fixing titre of 1–64 was passed through a Berkefeld N filter, and was then found to have a titre of 1–16.

Supernatant fluid injected intravenously into rabbits caused a rise in the Weil-Felix titre from practically negative to 1–320. The rickettsia suspension caused a similar rise.

Guineapigs inoculated with supernatant fluid developed immunity against typhus rickettsiae to at least the same degree as those inoculated with rickettsia suspensions : their sera also developed complement-fixing antibodies to a rather higher average titre than the sera of guineapigs inoculated with rickettsia suspensions.

Although the authors refer to the immunizing antigens contained in the supernatant fluid as " soluble " they do not exclude the possibility that some of them may be contained in very small rickettsiae. [See also GIROUD, this *Bulletin*, 1945, v. 42, 366.] *John W. D. Megaw.*

DURÁN, C. M. Histopatología de las lesiones del tifo exantemático—primera investigación hecha en Guatemala. [**The Histopathology of the Lesions of Exanthematic Typhus Fever.**] *Bol. Oficina Sanitaria Panamericana.* 1944, Sept., v. 23, No. 9, 791–5, 8 figs. English summary.

This paper contains an illustrated description of the specific typhus nodules known as Fraenkel's nodules.

These are liable to be confused with the myocardial lesions called Aschoff's nodules, which are, however, quite distinct, being of anaphylactic origin and resulting in cicatrix formation ; the latter contain numerous fibroblasts and eosinophiles which are absent from the typhus nodules.

The fundamental lesion of typhus is regarded as being an endothelial necrosis of varying intensity ; there may be desquamation of the cells or thromboarteriolitis.

The most interesting feature of the study was that in some cases testicular lesions were found, consisting of capillary endothelitis and congestion of the parenchymatous tissues ; these lesions have been regarded by some workers as occurring only in Rocky Mountain spotted fever, and never in louse-borne typhus. *John W. D. Megaw.*

RANDERATH, E. Pathologisch-anatomische Erfahrungen bei Fleckfiebersektionen. [**Findings in the Pathological Anatomy of Typhus Fever.**] *Deut. Militärarzt.* 1943, July, v. 8, No. 7, 376–80, 1 fig. [13 refs.]

A summary is given of the autopsy findings among the civil population of an occupied Soviet territory during a period of 16 months.

The exanthem could be detected by microscopical methods up to as late as the 37th day in some cases ; in others there was no trace of its presence on the

23rd day. Typhus nodules had disappeared by the 31st day ; they were never found in the heart, which showed a condition of typhus myocarditis with oedema of the interstitial tissues and infiltration of these by macrophage cells, together with a very few plasma cells and lymphocytes.

Among the lesions due to complications the most striking was a diffuse haemorrhagic glomerulonephritis ; during the winter months this occurred in about one-quarter of the cases. Bowman's capsules and the lumen of the renal tubules were sometimes packed with red cells. Haemorrhages into the other organs were not seen, and even the rash was seldom petechial.

Icterus was not infrequent ; it was associated with a " serous " hepatitis, and was most common in persons who had died during the first or second week. There was a suspicion that it might have been due to epidemic hepatitis, lighted up by the typhus infection.

Diphtheria, sometimes accompanied by a haemorrhagic bronchopneumonia, was a surprisingly frequent complication which often had not been diagnosed during life.

Suppurative parotitis was the chief septic complication. Gangrene of the extremities was quite uncommon.

Circulatory failure was believed to be due to damage to the vasomotor centres and to be associated with the condition of the peripheral vessels rather than with myocarditis. *John W. D. Megaw.*

v. Stockert. Die neuropathologischen Syndrome des Fleckfiebers. [**The Neuro-Pathological Syndromes in Typhus Fever.**] *Deut. Militärarzt.* 1943, June, v. 8, No. 6, 327–30.

The author discusses the association existing between the numerous nervous manifestations of typhus fever and the localization of the lesions in different parts of the central nervous system.

He describes three chief syndromes :—(1) The mid-brain syndrome, with disturbances of consciousness, somnolence, delirium, and disorders connected with the vegetative nerve centres. The most important of the last-named disorders is the characteristic fall of blood pressure, but how far this is due to loss of tone of the peripheral vessels, and how far to myocarditis is still a matter of conjecture ; there is, however, evidence of disturbance of function of the vegetative nerve centres. (2) The bulbar symptom-complex, in which there are auditory disturbances and signs of parasympathetic irritation. (3) The extra-pyramidal syndrome, with choreiform movements or rigidity.

John W. D. Megaw.

Ryjov, N. V. [**An Improvement of Minkievich's Modification of the Weil-Felix Reaction.**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow, 1944. Nos. 1–2, 42. [In Russian.]

The following is a translation of this short paper :—

" Having carefully verified Minkievich's reaction with haemolysed blood on a slide and compared it with the classical Weil-Felix reaction, the author introduced a quantitative method of estimation, as the result of which a complete parallelism of both reactions was observed, especially in the initial dilutions. A coincidence of the results was noted in 97 per cent. of the reactions. Furthermore, in order to avoid the necessity of using a hand-lens in examining the finely flocculated suspension after agglutination at the usual concentration(3 milliard per 1 cc.), the author increased its density to 15 milliard per 1 cc. by centrifuging 10 cc. of the suspension at 4,000 revolutions for half an hour ; the fluid is then

decanted, and to the sediment are added 2 cc. of physiological saline solution. This concentrated suspension, when used in drops together with haemolysed blood, produces a distinct agglutination in from ½ to 3 minutes in dilutions up to 1 : 64." *C. A. Hoare.*

TOKAREVICH, K. N. [**Laboratory Infections with Typhus Fever as Material for Discussion of the Problem of the Mechanism of Infection.**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow. 1944, Nos. 1–2, 26–9. [In Russian.]

A description is given of five cases of accidental infection of the laboratory staff with typhus fever. In two of these, transmission was by the droplet method, in two others by dry faecal particles of the lice being deposited on the mucous membrane, and in one by accidental injection with a pipette of teased-up louse-intestines. The course of the disease was severe or of medium severity in three unvaccinated patients, while in the two who had previously been vaccinated it ran a mild course. From these cases it is seen that in spite of the different methods of dissemination and portals of entry the rickettsiae provoked in all of them the typical disease, though considerably milder in the vaccinated persons.

The successful infection of vaccinated persons described in this paper is in contradiction with the consistently negative results obtained previously when feeding infected lice on vaccinated persons (2,000 observations). The author suggests that this discrepancy is due to the fact that in the laboratory infections the rickettsiae were "mature" and were introduced in massive doses, whereas the vaccinated persons on whom infected lice fed, received only small doses of rickettsiae from recently infected insects. It is concluded from these observations that immunization with killed rickettsiae does not afford complete protection against infection with typhus fever. *C. A. Hoare.*

GROMASHEVSKY, L. V., BAGROVA, A. S. & STEPANOV, I. R. [**The Nature of Interruptions in the Course of the Incidence of Typhus Fever in the Affected Populated Localities.**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow, 1944, Nos. 1–2, 17–26. [In Russian.]

In a previous communication the authors have demonstrated that the occurrence of new foci of typhus fever is always due to the introduction of the infection from some other focus but not to the preservation of the rickettsiae in healthy human carriers or elsewhere. In the present paper the authors deal with the epidemiology of inhabited localities, representing foci of typhus fever, in which there is an irregular alternation of months in which there occur cases of the disease and months in which no cases are recorded. From observations, carried out in 367 places of this type and subjected to a detailed statistical analysis, the authors arrive at the following conclusions :—

(1) The more a given territory is affected, the more frequently there are found in it inhabited places, where typhus fever tends to recur at irregular intervals. (2) Negative intervals, which do not exceed 1–2 months, are often misleading, for in such cases the continuity of the epidemic is actually maintained by unreported cases who are kept in their homes. (3) When there is a genuine interruption in the incidence, lasting over two months, recrudescences of the disease can only occur as the result of a new introduction of the infection from some other focus. (4) The complete eradication of typhus fever throughout the country can only be effected by rapid liquidation of every newly-established focus of the disease, followed by close observation in the course of two months. (5) The detailed study of the epidemiology of typhus fever fully supports the

view that patients suffering from the clinical form of the disease, as well as lice who have fed on them, represent the only sources of infection. [See also this *Bulletin*, 1942, v. 39, 141.] *C. A. Hoare.*

SHUBLADZE, A. K., SOLITERMAN, P. L. & STERNGOLD, E. J. [**Sera against Typhus Fever.**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow, 1944, Nos. 1–2, 35–7. [In Russian.]

After describing previous attempts to obtain a specific serum against typhus fever, the authors give an account of their own results with a serum prepared with an antigen obtained from the lungs of mice infected intranasally (two inoculations) with the blood of patients and brain emulsion of experimentally infected guineapigs. This strain of rickettsia was passaged into another series of mice, the lungs of which were teased up in saline with the addition of 0·2 per cent. formalin and used for the immunization of four horses. These were immunized in various ways with different doses, intravenously and subcutaneously. The sera obtained from the horses gave a positive Weil-Felix reaction with *Proteus X19* in dilutions from 1 : 640 upwards, as well as a positive Weigl reaction (rickettsia-agglutination) in a dilution of 1 : 320. The neutralizing prophylactic and therapeutic effect of these sera was tested on guineapigs. It was shown that they were capable of neutralizing 100 infective doses of rickettsiae (Otto strain); when introduced subcutaneously into these animals on the first day after infection they arrested the development of the disease, while on the fifth day they sometimes improved and shortened the course of the disease. The results of preliminary clinical tests of these sera appeared to be promising. *C. A. Hoare.*

KOVÁCS, G. & v. KUP, J. Neue Beiträge zum Krankheitsbild und zur Behandlung des Fleckfiebers. [**A New Contribution on the Clinical Aspects and Treatment of Typhus Fever.**] *Wien. klin. Woch.* 1944, June 2, v. 57, No. 21/22, 264–8, 4 figs.

The authors treated a large number of cases of typhus fever during the early months of the "present year" [presumably 1944].

The incubation period ranged from 5 to 21 days. In a few cases the onset was sudden with rigor, but usually the temperature rose steadily during the first two or three days during which there was headache with pains in the lumbar region and joints.

In about 50 per cent. of the cases the fever was of the continued type, in the other cases daily remissions of 1–1·5°C. occurred. There was leucopenia during the first 5–8 days; then leucocytosis gradually developed. In mild attacks the rash was inconspicuous, sometimes even absent. In severe cases the usual type of rash was morbiliform; occasionally it was scarlatiniform; it was haemorrhagic in 6 per cent. of the patients. The palms and soles were the only parts of the body that were uniformly exempt from rash.

Gangrene and bedsores were quite exceptional: pneumonia occurred in only two cases, and in them its onset was 14 days after defervescence.

Traces of albumin were found in the urine of 10 per cent. of the patients; no casts or blood cells were found except in one case in which there was haematuria lasting two days.

Nervous symptoms were few; "only one patient attacked his neighbour in the next bed."

Prolonged coagulation time, low blood pressure, and a condition of collapse were attributed by the authors to failure of the secretion of the adrenals which was regarded as the usual cause of death in uncomplicated cases. Myocarditis was believed to be of secondary importance.

Mention is made of the use of a specially sensitive strain of *Proteus X19* by which a significant agglutination reaction could be obtained within the first few days; sometimes even within 36 hours.

The authors claim that their system of treatment was responsible for the mildness of the nervous symptoms and the rarity of complications, but in the absence of comparable controls or other reliable evidence an attitude of caution seems to be justified.

"Ultraseptyl" (sulphamethylthiazol)* in doses of 5 cc., together with 10 cc. of 20 per cent. dextrose solution, was given once daily intravenously for five days in average cases, and for seven days in severe attacks. This was followed by daily intravenous injections of 10 cc. of 20 per cent. sodium chloride solution for 8-10 days, "also with dextrose" [presumably together with 10 cc. doses of 20 per cent. dextrose].

The salines were given to stimulate the activity of the adrenal glands.

John W. D. Megaw.

v. Bormann, F. Erfahrungen ueber Febris neuralgica periodica (Fünftagefieber) bei einem Truppenteil. [**Observations on Neuralgic-Periodic Fever (Trench Fever).**] *Deut. Militärarzt.* 1943, Aug., v. 8, No. 8, 457–63, 3 charts.

This paper deals with an outbreak of trench fever already described by the author [see this *Bulletin*, 1943, v. 40, 838].

Points brought out more clearly here are (1) that abortive attacks lasting one to three days are far more frequent than is generally supposed; about 40 per cent. of the cases seen by the author were of this type, and he states that they rarely find their way to the hospitals; (2) that shin-bone pains occurred in less than half of the cases, and had little diagnostic value, because they occurred also in typhoid fever, typhus fever, influenza, and Weil's disease; and (3) less than one-third of the attacks were of the periodic type, and in these the periodicity was highly irregular.

John W. D. Megaw.

Irons, J. V., Bohls, S. W., Thurman, D. C., Jr. & McGregor, T. **Probable Role of the Cat Flea, *Ctenocephalides felis*, in Transmission of Murine Typhus.** *Amer. J. Trop. Med.* 1944, Nov., v. 24, No. 6, 359–62.

Between November 1st and 10th, 1942, all three members of a family in Austin, Texas, fell ill with typhus fever, and it was suspected that the infection had been acquired from a flea-infested kitten brought from a local "feed store" about ten days before the onset of the first illness.

The kitten had been destroyed, but two others of the same litter were obtained, and from them about 200 fleas, identified as *Ctenocephalides felis* were collected. From two of three pools of fleas, each containing about 55 specimens, murine rickettsiae were isolated by intraperitoneal inoculation of guineapigs. Suspensions of the eggs of the fleas inoculated in the same way gave negative results.

Another person was found to have become infected with typhus a few days after having obtained two kittens from the same store, and some of the employees of the store were said to have had illnesses suggestive of typhus during recent years. The store was rat-infested, and a strain of murine typhus was isolated from a rat caught near the store.

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* The strength of the solution (presumably of the sodium salt) is not stated; the drug has been given by mouth in doses similar to those of other sulphonamides, but it has caused severe neuritis in some cases [see *Bulletin of Hygiene*, 1941, v. 16, 269, and *Bulletin of War Medicine*, 1942, v. 3, 44. For other references see *Bulletin of Hygiene*, 1940, v. 15, 635; 1942, v. 17, 537; 1943, v. 18, 540; and *Bulletin of War Medicine*, 1940, v. 1, 116; 1942, v. 2, 235; 1942, v. 3, 227.—Ed.]

About December 2nd, 1942, one of the laboratory technicians, who had been engaged 10-12 days previously on work with the infected fleas, fell ill with a fever which lasted nine days; the Weil-Felix reaction was negative on the 6th day and became positive, 1–320, on the 12th day.

Suspensions of the brains and spleens of the kittens from which the fleas had been collected were injected intraperitoneally into guineapigs, with negative results.

In May 1943 a cat and her kittens from the store were investigated; no infection could be detected in their fleas, and the kittens were found to be insusceptible to inoculation by murine rickettsiae. Brains and spleens of these kittens taken on the 14th day after inoculation failed to infect guineapigs.

The authors are inclined to the view that the cat fleas had acquired the infecting agent from the kittens; they mention the possibility that the fleas might have bitten an infected rat, but they think this unlikely because they had never found cat-fleas on rats, and they state that PRINCE [this *Bulletin*, 1943, v. 40, 775] found only three cat-fleas in an examination of 4,188 rats in the western United States. They point out that their exceptional finding does not in any way invalidate the fundamental importance of the rat and its fleas in the epidemiology of murine typhus.

Hardly any other cases of typhus were seen by physicians in Austin, Texas, during the year 1942.

[It is to be hoped that the cat will not be proved to be a reservoir of infection. In any case its activity in controlling the rat population is likely to do more than compensate for rare incidents of this kind.] *John W. D. Megaw.*

VAN ROOYEN, C. E. & DANSKIN, D. **Transmission of Imphal Scrub Typhus Infection to Egyptian Desert Rodents.** *J. Path. & Bact.* 1944, Oct., v. 56, No. 4, 570–72.

In December, 1943, Captain PARRY, R.A.M.C., inoculated guineapigs with blood from scrub typhus patients at Imphal, on the Assam-Burma border. From the guineapigs Major M. T. PARKER transmitted the disease to white mice which provided the infected material used in the present experiments. The dates of the transfers are not mentioned.

Mouse-brain suspensions from the infected mice were injected intraperitoneally into two species of Egyptian gerbilles, *Gerbillus gerbillus* and *G. pyramidum*; also into a jerboa, *Jaculus jaculus*. All these animals proved to be highly susceptible. After an incubation period of 12–14 days they became ill and eventually most of them died. The febrile reactions are not mentioned.

When passages were made with brain substance the incubation period after 12 transfers was 10–12 days; when peritoneal exudate was used, it was 7–10 days. The fatality rate in *G. gerbillus* was 100 per cent.; in *G. pyramidum* it was 65 per cent.

Enlargement of the liver and spleen, with exudate into the peritoneal and pleural cavities, were the most conspicuous features at autopsy.

Smears of the exudate after the 12th passage were stained by a modified Giemsa technique and also by Jenner's stain followed by Giemsa. Cells in the exudate contained rickettsiae, and large numbers of the organisms were found outside the cells. The appearance is said to have been exactly similar to that illustrated in the report by LEWTHWAITE and SAVOOR [this *Bulletin*, 1936, v. 33, 424, 921 and 922; *ibid.*, 1937, v. 34, 473 and 474] on scrub typhus in Malaya.

The rickettsiae could not be demonstrated by Macchiavello's method of staining.

In the jerboa the effects of inoculation were very similar, but the peritoneal exudate was more abundant. Death usually occurred two days after the onset of the illness. *John W. D. Megaw.*

SHKORBATOV, V. I. [**On the Results of Work by the Epidemiological Section of DVIEM on Tick-borne Typhus Fever in Khabarovsk Province.**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow, 1944, Nos. 1–2, 43–6. [In Russian.]

The author records miscellaneous epidemiological observations and experiments on tick-borne typhus fever, carried out by the Far Eastern Institute of Experimental Medicine (DVIEM) in the Khabarovsk province. It was found that the rickettsiae could be readily isolated both from the blood of patients during the pyrexial period and from ticks (*Dermacentor sylvarum*) at different periods of their development, by intraperitoneal inoculation of vitamin-deficient guineapigs. Hereditary (transovarial) transmission of the infection, followed up to the second generation, proved to be the rule in ticks. The skin reaction ("primary effect"), similar to that in man, was obtained in guineapigs subjected to bites of both infected and non-infected ticks, but not in rabbits. In man there does not appear to be any definite correlation between the skin reaction at the site of tick-bites and the development of an infection, but, as a rule, a reaction is present in positive cases. The blood of persons suffering or recently recovered from tick-borne typhus fever reveals the presence of agglutinins for *Proteus OX19, OX2* and *OXK*, the first-named usually being in highest titre and most persistent. The simultaneous production of agglutinins for three or two of these organisms is rarely observed. The usual titre for *Proteus OX19* is from 1 : 400 to 1 : 800, whereas the maximum titre for *OX2* and *OXK* does not exceed 1 : 200.

Considering the high degree of exposure (=70 per cent.) of the population of the endemic focus to bites by ticks, the incidence of typhus fever (up to 3 per cent.) among those bitten is insignificant. It would, therefore, appear that either the infection rate among the ticks under natural conditions is low, or that the susceptibility of human beings to this infection is low. In any case it would seem that the degree of infection in ticks does not play an important rôle in the epidemiology of the disease in question. *C. A. Hoare.*

EDMUNDS, P. K. **Rocky Mountain Spotted Fever : Treatment with Penicillin.** *Rocky Mountain Med. J.* Denver, 1944, Dec., v. 41, 910. [Summary taken from *J. Amer. Med. Ass.* 1945, Feb. 24, v. 127, No. 8, 490.]

Edmunds reports that a boy aged 14, who became ill with high fever, chills, headache, backache, vomiting and general malaise, was admitted to the hospital and was given sulfonamides as a matter of routine. These proved ineffective. A diagnosis of Rocky Mountain spotted fever was made and was corroborated by a history of tick bites and an increased agglutination dilution for Rocky Mountain spotted fever. One hundred thousand units of penicillin was added to 500 cc. of isotonic solution of sodium chloride and given by drip intravenously. Within two hours the temperature, which had been between 104 and 105 F., dropped to 100 F. and there was a definite improvement in the patient's condition. The boy recovered. The author hesitates to draw conclusions from one case, but he hopes that penicillin will be tried by others in Rocky Mountain spotted fever so that its benefits will be either proved or disproved.

YELLOW FEVER.

JACOBS, H. R. **Prolonged Viability of Yellow Fever Virus in Serum Mixtures containing Ammonium Sulfate.** *Proc. Soc. Exper. Biol. & Med.* 1944, Nov., v. 57, No. 2, 260–61, 1 fig.

Simple saline solutions are rapidly lethal to yellow fever virus and, although serum protein has a strongly preservative action, serum and saline mixtures are at best not very effective. Since "intracellular media" are slightly acid, the author tried the addition to media of salts that would give it a slightly acid reaction, and in this paper he gives the results of a trial of ammonium sulphate.

Ammonium sulphate was added in 3 per cent. and 1 per cent. amounts to a mixture of human serum, sodium chloride and yellow fever virus that is commonly used in routine experiments with yellow fever virus; this formed the control mixture and contained 10 per cent. of normal human serum, 0·4 per cent. of sodium chloride, and 10 per cent. of a 10^{-2} suspension of yellow fever virus. The three mixtures were incubated continuously at 37°C. and were tested daily by injecting 0·03 cc. into standard white mice, the viability of the virus being measured by its capacity to cause illness and death in mice between the 4th and 10th days.

The 1 per cent. ammonium sulphate mixture appeared to have the optimum strength, as was confirmed by further experiments; much living virus was retained for 6 days and an appreciable amount to the 8th day. At 22–25°C. and shielded from light, full strength of virus was preserved for 20 days. The *p*H of the medium was the important factor, the optimum being 6·3–6·5, and this was produced by the addition of 1 per cent. of ammonium sulphate. *J. F. Corson.*

HECHT, O. & ANDUZE, P. J. Contribución al conocimiento de la fauna Culicidiana de la parte norte de la Guayana Venezolana. [**Culicidae of Bolivar State, Venezuela.**] Reprinted from *Bol. Entom. Venezolana.* 1944, Sept. 30, v. 3, No. 3, 105–18. [16 refs.] English summary.

This study was undertaken in Upata, a district near Ciudad Bolivar in Venezuela, in order that light might be thrown on the presence of jungle yellow fever in those parts. In all, three survey expeditions were made; the first in April–June 1943, the end of the dry season and the start of the rains; the second in September–December 1943, at the end of the rains but when heavy showers are frequent; the third a short visit of 11 days towards the end of June 1944. Large numbers of larvae were seen in the pools in the first visit; also in boles of trees and in "casimbas" recently filled with water [Casimbas are hollows in the rocks which may retain flood-water for long periods]. In the latter part of this visit *Haemagogus* (three species) and *Sabethes*, sylvatic mosquitoes, were found; more of these were caught in the second expedition and still more in the third. In the same situations were found *Wyeomyia* and such sylvatic mosquitoes as *Finlaya* and *Compostegus*, together with *Aëdes*. Two species were found which are believed to be new records for Venezuela, namely *Aëdes* (*Compostegus*) *leucocelaenus* and *Culex brevispinosus*; there is also *Aëdes* (*Finlaya*) *upatensis*, which had previously been reported by ANDUZE and HECHT. A few notes are given as to the habitat of 43 species and a table showing the species, distribution and habitat of 12 in which the yellow fever virus can persist, of seven which can transmit the virus by their bite, and three which have been found naturally infected, namely *Aëdes leucocelaenus*, *Haemagogus capricorni* and *Sabethines*. [A useful pamphlet for reference.]

H. Harold Scott.

PLAGUE.

SAVINO, E. & GOOBAR, J. K. La peste rural en el departamento de Rio Seco (Córdoba). Su estudio epidemiológico con especial referencia al *Graomys griseoflavus centralis* como depósito de virus pestoso, asi como también el hallazgo de peste espontánea en algunos roedores agrestes y en gatos domésticos. [**Rural Plague in Rio Seco (Córdoba) Argentina.**] *Rev. Inst. Bacteriológ. "Dr. Carlos G. Malbran."* Buenos Aires. 1944, Sept., v. 12, No. 3, 287–92. [14 refs.]

Some of the figures relating to this survey have already been given [this *Bulletin*, 1945, v. 42, 33]. The authors comment on their findings: Their observations demonstrate the existence of plague in *Graomys griseoflavus centralis*, in *Hesperomys murillus cordovensis*, in *Galea musteloides leucoblephora* and in cats (*Felis domesticus*). They are inclined to look on *Graomys griseoflavus centralis* as the reservoir of plague in the region studied. That animal is found in the neighbourhood of dwellings ("peridomestic") and has a preference for the nests of birds. Proof of plague in cats has been furnished and plague bacilli were cultivated from the bone marrow of three cats which had died spontaneously and had been buried for some time. A human case of plague developed in a man who had skinned a dead cat. *W. F. Harvey.*

FOSTER, V. W. **Epidemic of Plague in Region of Cajacay, Peru.** *Bol. Oficina Sanitaria Panamericana.* 1944, Aug., v. 23, No. 8, 698–9.

MACCHIAVELLO, A. & URIGUEN, D. **Experimental Plague in Guinea Pigs inoculated with** *Pasteurella pestis* **of Ecuadorian Origin.** *Puerto Rico J. Pub. Health & Trop. Med.* 1944, June, 577–601.

The greater part of the argument of the authors may be said to centre round the definition of bacillary virulence. It is reasonable to contend that the definition should take into account, at least, invasive capacity and toxic effect. These may, indeed, be to some extent interdependent, but must also be considered as capable of differing quantitatively. In this investigation, strains of plague from the Andean region were tested on guineapigs and the results are contrasted with the pathological findings described for strains from other countries. Several interesting features of the Andean strains are brought out both in experiment and discussion. They are highly invasive and peculiarly pneumotropic. Characters on which the authors insist for their strains are; that they belong to that rare group for plague, the S and not the R form: that although they are highly invasive and spread through the body they are of low toxicity, and that the degree of invasive power becomes fixed at a limit which cannot be increased by further serial passage. It is, rather paradoxically, the very mildness of plague in the Andean regions that allows time for more frequent production of secondary pneumonic plague. The authors believe that the characters which they describe, so far as they are limited to Ecuadorian strains, represent "a phenomenon dependent on their peculiar antigenic structure" and are due to dissociation of the two main qualities which constitute virulence—invasiveness and toxicity. The lesions peculiar to Ecuadorian plague strains on inoculation into guineapigs are:—(1) great involvement of the pelvi-aortic glands, and (2) pulmonary lesions, especially of the necrotic type. *W. F. Harvey.*

CHOLERA.

RANTA, L. E. & DOLMAN, C. E. **A Mouse Protection Test for Cholera Vaccine.** *Canadian J. Pub. Health.* 1944, Dec., v. 35, No. 12, 473–80.

Pfeiffer's phenomenon has long been used for the assay of immunizing power, but is undoubtedly very cumbersome. Discovery of the fact by GRIFFITTS [this *Bulletin*, 1942, v. 39, 764] that the addition of mucin to an immunity testing dose of living cholera vibrios greatly increased their virulence for mice, furnished the necessary clue to simplification of the test. It is based upon the analogy—admittedly a loose one—between *V. cholerae* septicaemia in mice and human cholera, but is " at least no more fallacious than many biological tests currently in vogue in other fields." It is certain that the phenol-killed vaccines of the authors [this *Bulletin*, 1943, v. 40, 540] inoculated subcutaneously in human beings do cause the development of circulating antibodies capable of conferring passive protection upon mice." In the elaboration of the test an important point has been further elucidated, namely that of the protection conferred by 1-dose, 2-dose and 3-dose immunization, respectively ; the conclusion has been reached, that a spaced 2-dose inoculation, in mice, is much better than a 1-dose, and that a spaced 3-dose immunization is not significantly better than one by two doses only. As the test involves immunization by the intraperitoneal route and testing by the same route, it was necessary to meet the criticism that the immunity developed might be a purely local and not a systemic (humoral) immunity. This criticism has been met, for example, by the experimental demonstration that " mice which had received their injections of vaccine subcutaneously showed as good protection against 5 and 10 m.l.d. of *V. cholerae* administered intraperitoneally as did similarly-challenged mice which had been vaccinated by the intraperitoneal route."

Another finding of considerable importance, considering the great tendency to incorporate a variety of antigenic strains in current commercial vaccines, is that " a degree of Inaba-Ogawa cross-protection in mice sufficiently high to eliminate the need for challenging with both type strains " exists and that, presumably, a vaccine of either strain would also produce some immunity against the other. It must not be assumed, however, that type specific " O " antigens play no part in mouse protection. In the experimentation carried out the testing strain used was Ogawa *V. cholerae* whose virulence was maintained by successive isolations from mouse heart blood.

The authors do not recommend keeping cholera vaccines beyond two years and put forward their proposals for adoption of a conventional test of all cholera vaccines before release for use, in the following terms :—" The arbitrary standards of antigenic potency recommended are that each vaccine should be tested, by the method described, on not less than 30 mice, one half of which are subsequently challenged with 5 m.l.d., and the other half with 10 m.l.d., of mucinized vibrios. Of the former groups, 100 per cent., and of the latter group, at least 80 per cent., should survive." The method of immunization referred to was that of two doses, 0·25 and 0·5 cc. of a 1 : 5 dilution of vaccine containing 8,000 million vibrios per cc., at an interval of one week. It had been found originally that 1 m.l.d. of mucinized vibrios was consistently represented by 0·5 cc. of a 1 : 1000 dilution of the standardized suspension.

W. F. Harvey.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

MARKELL, E. K. **Intestinal Parasitic Infections in a Naval Hospital in New Zealand.** *U.S. Nav. Med. Bull.* 1945, Jan., v. 44, No. 1, 65–8.

The patients [presumably all Americans] belonged to the Navy and Marine personnel, and a few soldiers, who were admitted to a Naval Mobile Hospital in New Zealand, having come from all parts of the South Pacific area; more than 80 per cent. of them represented random samples of patients admitted to that hospital. Specimens of faeces were taken, as a rule, without regard to the condition of the patients.

Fresh coverslip preparations were examined in the case of all liquid or "mushy" stools, one unstained and one after adding D'Antoni's iodine [this *Bulletin*, 1938, v. 35, 455] which was found better than Lugol's or Gram's solution. The floatation method of FAUST *et al.* [*ibid.*, 1939, v. 36, 144] was used and smears of the deposit were stained with D'Antoni's iodine; films stained with iron haematoxylin were also prepared from each specimen of faeces.

Altogether 2,388 "stool examinations" were made on 1,371 patients; intestinal parasites were found in 375 (28 per cent.) of the patients.

The author estimates, from the observations of SAWITZ and FAUST [*ibid.*, 1942, v. 39, 765] that he found 52 per cent. of the *Entamoeba histolytica* infections, 65 per cent. of the amoebic infections, and all infestations with hookworms *Trichuris* and *Ascaris*. The percentages of patients harbouring various parasites and saprophytes are shown in a Table: *E. histolytica* in 8·09, hookworm in 8·46, *Trichuris trichiura* in 2·12, *Giardia intestinalis* (*G. lamblia*) in 1·96, *Isospora hominis* in 0·37, and *Enterobius vermicularis*, *Hymenolepis nana*, and *Taenia saginata* each in 0·07 per cent. Since the incidence of hookworm and amoebiasis was about double that occurring in the U.S.A., many infections were probably acquired in the South Pacific area, and this is supported by the fact that hookworms were found in men from the northern States of the U.S.A. who had not lived in hookworm endemic areas before going overseas. *Isospora hominis* was found in five men; four had no symptoms but the fifth had dysentery for over a month and no other cause for it was found. Most of the men had been taking mepacrine and this may explain the low percentage of *Giardia* infections. *J. F. Corson.*

BOSE, A. N., GHOSH, J. K. & RAKSHIT, P. C. **A Butyl Acridine Derivative in 'Intestinal Giardiasis.' A Preliminary Note.** *Indian Med. Gaz.* 1944, Dec., v. 79, No. 12, 595–6.

Three cases of giardiasis were treated with a butyl-acridine compound, 2-chloro-7-methoxy-5 (8-diethylaminobutyl) aminoacridine which was being tried also at that time in human malaria [see above, p. 444]. The patients, two adults and a child of 5 years of age, had suffered from various alimentary disturbances—indigestion, diarrhoea, colic, &c. The drug was given by mouth three times a day for five days, in doses of 30 mgm. for the adults and 15 mgm. for the child. The stools were examined frequently for several weeks afterwards with negative results, and no relapse occurred within an observation period of six months. The patients improved in health and were regarded as cured.

J. F. Corson.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

DIXON, K. C. & FULLER, W. **The Annular Forms of** *Spironema persica. J. Roy. Army. Med. Corps.* 1945, Jan., v. 84, No. 1, 31–2.

The main interest of this note is the record of the occurrence of spirochaetal relapsing fever among troops in Cyprus about nine days after bivouacking in caves infested with *Ornithodorus tholozani.* It was generally believed in rural areas in Cyprus that bouts of fever followed the bites of ticks. The causative organism has been transmitted to guineapigs and is almost certainly *Spirochaeta persica,* which is widespread in the Levant.

The annular forms are described by the authors as consisting of "motile endoplasm rotating inside an ectoplasmic envelope." *E. Hindle.*

WOLMAN, M. **Observations on the Value of Treatment in Louse-borne Relapsing Fever.** *East African Med. J.* 1944, Nov., v. 21, No. 11, 336–40.

A comparative study of 311 unselected cases of louse-borne relapsing fever in Ethiopia.

The cases were divided into three groups; one group was treated with 0·60 gm., "Neo I.C.I." (an Italian neosalvarsan preparation) on admission, and after two days with bismuth intramuscularly ("Salbiolo," containing 0·06 gm. in a 1 cc. ampoule); the second with human convalescent serum; and the patients of the third group received only symptomatic treatment.

The salvarsan-bismuth treatment reduced the number of true relapses and lengthened the interval between the first and second attack, but it did not reduce the mortality rate, or shorten the first attack, or reduce the number of "non-specific" rises in temperature [that is, rises in temperature but with negative blood findings].

The results confirm the general opinion in Ethiopia that specific treatment of this disease has little, if any, value. *E. Hindle.*

CROSS, R. M. **Penicillin in Weil's Disease.** *Lancet.* 1945, Feb. 17, 211–12.

An airman was admitted to hospital with sore throat, headache and general pains, of three days' duration; his temperature was 100°F., pulse rate 130, the leucocyte count 18,000 per cmm. with 79 per cent. of neutrophiles. Haemolytic streptococci were cultured from a throat swab.

During the next two days he had marked generalized muscular tenderness, and on the 5th day of illness he had epistaxis, slight jaundice, and a few purpuric spots were seen on his chest. His urine contained albumin and bile, granular casts, and many red cells, but there was no growth in culture media. Weil's disease was diagnosed and his blood was inoculated into a guineapig and blood serum sent to the Wellcome Research Laboratory for agglutination tests. During the next four days he had hiccup and frequent vomiting and his condition became much worse; the serum bilirubin was 12·5 mgm. per 100 cc. and the blood urea rose to 320 mgm. per 100 cc. His cerebrospinal fluid contained 0·04 per cent. of protein, normal globulin, chlorides 760 mgm. per 100 cc. and the W.R. was negative, gamboge and Lange tests normal, and the Van den Bergh test gave an immediate direct reaction.

Specific (*L. icterohaemorrhagiae*) antiserum was given—20 cc. i.v. on the 9th day of the disease, and 10 cc. i.m. daily on the following days up to a total dose of 60 cc., but his condition remained serious with, at times, delirium and incontinence. After many examinations, his urine now showed leptospirae

for the first time ; the guineapig died 10 days after inoculation and an autopsy showed jaundice and multiple haemorrhages in the lungs, and leptospirae were found in its urine.

He was now (14th day) given sodium penicillin by slow intravenous drip ; after 24 hours (120,000 units) no leptospirae could be found in his urine. The report of the agglutination test was : 1/10 trace, 1/30 positive, 1/100 positive, 1/300 trace, further dilutions negative.

The patient gradually recovered but had microcytic anaemia (red cells 3,740,000, haemoglobin 9·5 gm.) ; the blood urea returned to normal 10 days after treatment with penicillin was begun. Altogether 800,000 units of penicillin were given over seven days.

The curative action of penicillin on this strain of *L. icterohaemorrhagiae* was confirmed in a controlled experiment with guineapigs. *J. F. Corson.*

YAWS.

LeFevre, Ira, D., Jr., McDermott, K. F. & Venner, R. B. **Yaws Survey on Nanumea Atoll.** *U.S. Nav. Med. Bull.* 1944, Oct., v. 43, No. 4, 739–41.

The authors examined 149 natives of the island of Nanumea in the Ellice Islands, their aim being " to discover the nature and appearance of the primary yaw for diagnostic purposes, the site and appearance of the secondary lesions and the various ages at which the Kahn test would be positive." They accepted the case histories as they had previously found them very reliable in a filarial survey, and this was confirmed in the present survey ; 46 per cent. of the 97 children examined gave a history of yaws, and 46 per cent. of the 66 Kahn tests made in this group of 97 children were positive [presumably all the children with positive Kahn tests also gave histories of having had yaws].

The people examined were divided into (1) children under 3 years old, (2) children 4–16 years old, and (3) adults over 16 years old. The primary yaw was found only in group (1) and among the younger children of group (2) ; secondary yaws were found mostly on the palms and soles, and there were very few cases of tertiary yaws. The figures of findings under various subheads—number examined, history of yaws, clinical yaws present or absent, Kahn test positive or negative, &c., are tabulated. About 50 per cent. of children under 16 years of age showed evidence of yaws, but the highest proportion (71 per cent.) of Kahn positive reactions was found among the adults. *J. F. Corson.*

i. Whitehill, R. & Austrian, R. **The Treatment of Primary and Secondary Yaws with Penicillin. A Preliminary Report.** *Bull. Johns Hopkins Hosp.* 1944, Oct., v. 75, No. 4, 232–40.

ii. —— & ——. **Treatment of Yaws with Penicillin.** *Bull. U.S. Army Med. Dept.* 1945, Mar., No. 86, 84–91.

i. Seventeen cases of active primary and secondary yaws in natives of Fiji were treated with penicillin ; 11 of the patients had had no previous treatment with arsenical drugs while the other six had relapsed after such treatment. In 16 cases the Kahn test was positive before treatment with penicillin, and spirochaetes were seen by dark-ground illumination in all cases.

Penicillin was given intramuscularly in doses of 15,000 units every four hours, day and night, for 5–6 days ; the solution, in normal saline, contained 10,000 units per cc. Fourteen patients received 450,000–500,000 units while the

remaining three patients had 280,000, 200,000 and 100,000 units respectively. During the first 16 hours the total dosage varied from 50,000 to 90,000 units and at the end of this period all lesions were healing and, except one, they had completely healed within three weeks ; ulcers and granulomata several centimetres in diameter healed within a week.

Spirochaetes were not seen by dark-ground illumination after 16 hours from the beginning of treatment in 16 of the cases, while in the remaining case one spirochaete was seen at 16 hours, none at 40 hours.

The Kahn test remained positive in all cases during the short observation period of two to seven weeks.

As healing took place as quickly and completely after the smaller dosage given to three patients, the authors think that this dosage is probably sufficient but that further study of larger numbers, and for a prolonged period of observation, is necessary before final conclusions on this and other points can be drawn.

ii. This is an account of the same 17 cases of yaws and its contents are substantially the same as in the preliminary report. In an addendum, however, the authors state that further observations on these 17 patients together with notes on 25 additional cases have been submitted for publication, and they give their conclusions, which were similar to those in the preliminary paper. *J. F. Corson.*

LEPROSY.

FERNANDEZ, J. M. M. Importancia das reações imunológicas no exame das criancas comunicantes de leprosos. [**Significance of Immunological Reactions in Examination of Child Contacts of Lepers.**] *Rev. Brasileira Leprologia.* S. Paulo. 1944, Sept., v. 12, No. 3, 201–13, 2 figs. on 1 pl. English summary.

H. W. WADE has classified the results to individuals exposed to leprosy as follows :—

1. The bacillus fails in its attack and is eliminated—a common event.
2. The bacillus enters but is checked and produces no symptoms ; afterwards, according as resistance is maintained or breaks down, the infection may be eliminated, or remain latent, or give rise to symptoms.
3. Localized signs are produced which may persist without further development or may spontaneously disappear.
4. Clinical signs of a benign nature may ensue—nervous leprosy.
5. Clinical signs of a serious nature may ensue—lepromatous or cutaneous leprosy.

R. COCHRANE notes that children acquiring infection in infancy may go on to : (1) Progressive disease. (2) Do the same when resistance subsequently breaks down after a period of latency. (3) Show a stationary condition with a lesion checked and inactive, but evident. (4) The lesion may disappear completely.

After these preliminary statements the author goes on to describe the lepromin reaction and its interpretation : a positive indicating that the subject has been infected with the organism and is sensitized and that resistance is being offered so that the prognosis is favourable. *Per contra,* children reacting negatively call for rigorous supervision. It must be remembered, however, that infants, though living in close contact with lepers, only exceptionally react positively under 12 months of age. If after that time and in these circumstances the reaction is still

negative, careful watching is called for "as the child may be incubating an infection of a malignant type." In those with obvious manifestations and a positive reaction the prognosis is favourable. In other words, a positive reaction indicates resistance. It is useful also retrospectively in that a healed cicatrized lesion, if leprous, will react with a local erythema. Further, it will reveal hidden lesions, as in a skin apparently normal; a subcutaneous injection of 0·5–0·75 cc. may in 24 hours show up a number of erythematous blotches, quite unsuspected.

We may sum up the information derived from the lepromin test as follows :—

I. *Patient showing active lesions.*
   (*a*) *Lepromin reaction positive*: Prognosis good; strict vigilance not needed.
   (*b*) *Lepromin reaction negative*: Make bacteriological examination. If the organisms are not found, watch the case carefully and repeat the test periodically. Anyway it is advisable to start treatment with chaulmoogra.

II. *Patient showing residual lesions.*
   (*a*) *Lepromin positive*: As in I (*a*).
   (*b*) *Lepromin negative*: Watch case carefully; repeat the test.

III. *Patient showing no obvious lesions.*
   (*a*) *Lepromin positive*: Note signs of early, healed lesions. As in I (*a*).
   (*b*) *Lepromin negative*: Careful watching; repeat test periodically. Start specific treatment with chaulmoogra if clinical signs appear. If the reaction continues negative, give a guarded prognosis.

[See also this *Bulletin*, 1935, v. 32, 862; 1939, v. 36, 692; 1940, v. 37, 335; 1941, v. 38, 703; 1942, v. 39, 226, 227, 696; 1943, v. 40, 245, 316–17, 548, 786.] *H. Harold Scott.*

Dos Santos Neves, E. Mais uma tentativa de tratamento do doente de lepra. [**Another Suggested Treatment of Leprosy.**] *Rev. Brasileira Leprologia.* S. Paulo. 1944, Sept., v. 12, No. 3, 247–51.

This short article is of the nature of a preliminary note with brief remarks on five cases of leprosy which had failed to respond to the customary treatment with chaulmoogra or which had not had any previous treatment, but which showed marked improvement and negative results to examinations for *Myco. leprae* after the new treatment.

The idea arose from the report of a patient under Dr. Etcheverry in Buenos Aires, with definite signs of leprosy and bacterially positive, who after an attack of jaundice with desquamation appeared to be cured of his leprosy [no reference is given]. The author then argued as follows: Vitamin A is the anti-infection vitamin and its absorption is facilitated by bile. Carotene is transformed into vitamin A in the liver; *Mycobacterium leprae* is a resistant organism, as evidenced by its long latency and difficulty of inoculation into animals; abuse of remedies, even chaulmoogra, is prejudicial; spontaneous cure (*i.e.* cure by the unaided efforts of nature) sometimes takes place. Hence a rational mode of treatment would be to assist nature by administration of vitamin A and a cholagogue. The author, therefore, started by using Decholin, a product of the Riedel laboratory, and vitamin A from the Dahr laboratory; later, he used a cholagogue and carotene and carotenoid provided by the local laboratory. Injections were made intramuscularly three times a week. The results recorded are very striking. [But unfortunately nothing is said of the dosage, nor the length of time for which the treatment was maintained, nor of any follow-up of patients to see whether the improvement or cure with absence of bacteria was permanent.] *H. Harold Scott.*

SILVEIRA, L. M. Patogenia do mal perfurante plantar. [**Pathogeny of Perforating Ulcer of the Sole.**] *Rev. Brasileira Leprologia.* S. Paulo. 1944, Sept., v. 12, No. 3, 255–66, 13 figs. on 6 pls.

Perforating ulcer of the sole has (theoretically, according to the author) been ascribed to nerve or vascular lesions, to dyscrasiae or certain intoxications, but it is difficult to say what part each of these may play in the pathogeny of plantar ulcers. Briefly, the author will not have anything to say for any of them except in so far that the initial phenomenon is loss of sensation of pain. That being so, any wound goes unperceived and consequently untreated and infection is superadded after which destruction of tissues, soft tissues and even bone, proceeds apace. If seen in the early stage the ulcer should be treated on the lines proper to any wound, by cleanliness and rest and thereafter careful observation to see that the healing does not break down owing to the analgesia. If the patient does not come for treatment till later, surgical intervention will be necessary and, in many cases, amputation. There are photographs showing the condition before treatment and the results of surgery. *H. Harold Scott.*

LINHARES, Herminio. VII. Contribuição ao estudo da lepra murina. [**Contribution to the Study of Murine Leprosy.**] *Rev. Brasileira Leprologia.* S. Paulo. 1944, Sept., v. 12, No. 3, 217–44. [154 refs.] English summary.

This article is a " contribution to the study " only in so far as it summarizes our present-day knowledge of the subject of murine leprosy and its similarities to the human disease. The author deals with the organism, Stéfansky's bacillus, its characters and the results of attempts at culture of material from different sources and on different media, and briefly discusses the relations between the human and rodent disease, concluding that Hansen's and Stéfansky's organisms are one and the same, but that, epidemiologically, there is no connexion between human and murine leprosy, nor is there any proof that the bacilli exist saprophytically in the soil and produce their respective diseases by penetrating cutaneous lesions. All the statements made are supported by references to the literature and a full and useful bibliography of 154 references is given. The only original statement is a note on a trial of penicillin in the treatment of murine leprosy ; the results are not conclusive and so far are not encouraging. *H. Harold Scott.*

HELMINTHIASIS.

NIÑO, F. L. Papel de los helmintos en las llamadas apendicitis verminosas. [**Rôle of Helminths in the So-called Verminous Appendicitis.**] *El Día Médico.* Buenos Aires. 1944, Nov. 6, v. 16, No. 45, 1371–2, 6 figs.

The term " verminous " is here used in its strict etymological sense of " associated with worms." Photomicrographs are reproduced showing cross-sections of the appendix with worms in the lumen and inflammatory changes in the wall of the viscus. Professor Niño refers to his address in 1937 when he recorded that of 1,018 appendices which he had examined twenty of them (1·96 per cent.) contained helminthic parasites and thirteen of these were *E. vermicularis.* In the next seven years he examined 745 more and found another 36 (4·8 per cent.), giving a total of 56 with worms among 1,763 appendices examined, 3·17 per cent. Fifty of the 56 positive were *E. vermicularis*, four were segments of *Taenia saginata*, one had ova of *Trichuris trichiura*, and one

had ova of *Ancylostoma* or *Necator*. Of the 50 with *E. vermicularis*, 34 were from females and only 16 from males ; this preponderance of females has been noted by other observers. [References to the association of helminths and appendicitis in the *Tropical Diseases Bulletin* have been numerous. We may mention the following : 1934, v. 31, 131, 397 ; 1937, v. 34, 23, 24, 457, 879 ; 1940, v. 37, 648–9 ; 1941, v. 38, 525 ; 1942, v. 39, 192, 634 ; 1943, v. 40, 328, 402, 555, 927. *Hymenolepis nana* may also be seen (this *Bulletin*, 1943, v. 40, 556) and the ova of schistosomes frequently ; *S. haematobium* (*ibid.*, 1941, v. 38, 40), *S. mansoni* (1942, v. 39, 465), *S. japonicum* (*ibid.*, 466), ova of *Ascaris lumbricoides* (1943, v. 40, 556) and the worm itself (1937, v. 34, 23, with an illustration showing the worm in the lumen on p. 24).] *H. Harold Scott.*

OLSON, O. W. **Bionomics of the Lymnaeid Snail,** *Stagnicola bulimoides techolla*, **the Intermediate Host of the Liver Fluke in Southern Texas.** *J. Agric. Res.* 1944, Nov. 15, v. 69, No. 10, 389–403, 4 figs. [24 refs.]

STEPHENSON, W. **Survival of** *Fasciola hepatica* **L.** *in vitro*. [Correspondence.] *Nature.* 1945, Feb. 24, 240–41.

Fasciola hepatica will live for 60 hours at 36°C. in the following solution : NaCl 150 mM., KCl 10 mM., $CaCl_2$ 1 mM., borax 6 mM., glucose 30 mM., *p*H 8·6 [mM.=0·001 Mol]. This time is longer than previously recorded survival times and is adequate for preliminary tests on the effects of anthelmintics *in vitro* ; in such tests it has been found that carbon tetrachloride is innocuous, although in man it is probably the best anthelmintic.

Experiments with various solutions gave the following results : (1) Borates prolong survival, presumably by control of bacteria ; acriflavine, merthiolate and silver protein are toxic to the worm and sulphanilamide does not affect the survival time ; (2) the optimum *p*H is 8·1, the optimum temperature 36°C. ; (3) wide variations in osmotic pressure, K/Na ratio, and Ca/Na ratio have little effect on survival ; (5) sugars, in the following order of efficiency, increased survival times—fructose, glucose, galactose or maltose, lactose or sucrose ; (6) ligatured worms in glucose survive as long as unligatured worms, which suggests that glucose can enter through the body wall. [In a personal communication the author has explained that a ligatured worm was one to which a silk ligature was applied just posterior to the pharynx in order to prevent communication between the intestines and the exterior.]

J. F. Corson.

HELANDER, E. V. Ueber die Magensekretion bei Bothriocephalusträgern. [**The Gastric Secretions in Persons harbouring** *Diphyllobothrium latum*.] *Acta Med. Scandinavica.* 1945, Suppl. 155, 115 pp., 2 figs. [Bibliography.]

This book is reviewed on p. 512.

BARRETT, N. R. & THOMAS, D. **Pulmonary Hydatid Disease.** *Brit. J. Tuberculosis.* 1944, Apr.–July, v. 38, Nos. 2 & 3, 39–95, 31 figs. (28 on 16 pls.).

The following is the authors' summary :—

"*Part* 1.—*Pathology.*

"1. The life-cycle of the parasite and the anatomy of hydatid cyst are described. The incidence of hydatid disease in this country is reviewed.

"2. The pathological changes peculiar to pulmonary hydatid disease are recorded. Hydatid cysts can be " simple " or " complicated." Simple cysts are those in which the parasite is alive and intact ; the definition has no reference

to changes occurring in the surrounding lung. Complicated cysts are those in which an accident, such as rupture or infection, has befallen the parasite itself.

"3. Pulmonary hydatids may be single or multiple. The latter are due either to multiple primary infestation, to secondary echinococcosis, to daughter cyst formation, or to rupture of a liver hydatid through the diaphragm into the lung. The pathology of these conditions is described.

"4. A simple cyst may be extruded from the parenchyma of the lung either into the bronchial tree, the pleural cavity, the chest wall, or the mediastinum. If the cyst ruptures into a large bronchus the parasitic membranes can be totally discharged and, in this way, spontaneous cure occurs. In the majority of cases, however, drainage is incomplete, the disintegrating membranes become impacted, and a chronic lung abscess forms. If the cyst herniates from the lung into the pleural cavity, a pleural effusion, a tension pneumothorax, a haemothorax or a pneumothorax may occur at first, and these may be followed by the growth of multiple secondary cysts if the parent hydatid leaks or ruptures. A lung cyst can herniate directly into the chest wall and acquire a secondary adventitia. The parasite may project into the mediastinum and cause pressure upon the oesophagus, the large vessels, nerves or the vertebral column. It may produce nerve palsies, mediastinal emphysema, etc.

"5. Demonstration of hydatid elements in the sputum is proof positive of the diagnosis.

"6. The biological tests which are commonly used for the purpose of diagnosis are described, and the following points are noted :—

"A. None of the tests is 100 per cent. specific, but false positives are sufficiently rare to be regarded as exceptions which prove the rule.

"B. The interpretation of results requires mature experience.

"C. The difficulty of obtaining biologically active fluid with which to carry out the Casoni test is stressed. The only way of assessing the value of a given sample of fluid is to try its effect upon a patient known to be suffering from hydatid disease. The fluid will not keep indefinitely, and that most likely to be active is one which has been taken from a cyst which originally contained scolices and hooklets.

"7. The X-ray appearances of pulmonary hydatid disease are described. The lesion may simulate many other conditions, and the majority of the radiograms will not be typical of the disease.

"*Part II.—Case Histories.*

"8. The case histories of 19 patients are described. These cases have been seen by us during the last few years, and the following observations are based upon them.

"9. *In this country* the possibility of hydatid disease is not entertained until other pathological conditions have been ruled out. For this reason diagnosis is often delayed until the parasite is revealed by operation or expectoration. Delay, occasioned by inaccurate diagnosis, not only wastes valuable time but increases the hazards of treatment. Town dwellers are afflicted as often as farmers.

"10. The majority of the patients seek medical advice within a short time of the onset of symptoms.

"11. The presenting symptom is generally haemoptysis : the patient coughs up one or two drachms of blood. The bleeding often occurs in the early morning and is associated with cough ; it may be instigated by exercise or trauma. Massive haemoptysis is unusual.

"12. The first signs and symptoms may be due to anaphylaxis. These are generally ignored or, at best, treated symptomatically. Too much stress has been laid upon urticaria as the commonest manifestation, whereas, in

reality, cough, dyspnoea, tachycardia, palpitations, pruritus, etc., are more frequent. Two of our patients were at first thought to be suffering from measles.

"13. Thoracic pain, which is generally localized to the vicinity of the parasite, is an early symptom. It is transient and probably not due to obliterative pleuritis. Pleural adhesions form late.

"14. Sudden expectoration of a large amount of clear, salt-tasting fluid is diagnostic of the rupture of a simple cyst.

"15. There are no signs pathognomonic of hydatid disease; indeed, in the case of simple cyst, the signs are notable for their absence, and the first abnormality to be detected may be due to the onset of complications. The great majority of simple hydatids are symptomless.

"16. The disease is apt to be associated with other conditions such as pulmonary tuberculosis, silicosis, pneumonitis, etc.

"17. A striking feature of the cases we have seen is that so few had hydatid cysts in viscera other than the lungs. Bilateral cysts are not uncommon.

"18. The dangers of aspirating an hydatid cyst, for purposes of diagnosis or treatment, are not sufficiently realized. The fact that aspiration can sometimes be done without danger does not justify its use under any circumstances.

"19. The disease is generally mistaken for pulmonary tuberculosis, atypical pneumonia, new growth, tuberculous pleurisy with effusion, or pneumothorax of unknown cause.

"20. The patient who harbours an hydatid cyst must either discharge the parasite or die as a result of it.

"*Part* III.—*Treatment.*

"21. The relative merits of surgical and expectant treatment are reviewed.

"22. Neither drugs nor X-rays can destroy the parasite in the lung, and even if success could be achieved in these ways a foreign body would be left in the tissues. Suppuration would ultimately be inevitable.

"23. Statistics are available to indicate the chances of expectoration of the parasite under different conditions, but no man can predict the fate of any individual patient. He who harbours an hydatid cyst stands beneath the sword of Damocles.

"24. A survey of the literature indicates that surgical opinion, the world over, is in favour of removing the parasite at the earliest possible moment. The mortality and morbidity of operative removal is much lower than that of conservative treatment.

"25. The safest way to enucleate a simple cyst is to treat it as a lung abscess—that is, to localize the lesion accurately and to create pleural adhesions (if these are not already present) before traversing the pleural membranes. The fact that surgeons whose experience of this disease is great make light of the dangers of the open pleura does not, in our opinion, entitle the tiro to follow their example. The technique of various operative procedures is described.

"26. If the parasite has produced permanent pathological changes in the parenchyma of the lung or in the bronchial tree, it is manifest that simple enucleation of the cyst will not cure the patient. The operation will avert the dangers of anaphylaxis, rupture, haemorrhage, etc., but leave the patient to endure the ravages of pulmonary suppuration.

"27. In a selected group of cases the treatment of choice is lobectomy. The arguments in support of this statement are catalogued, and the results so far achieved are such as to justify further investigation of this matter."

DAVIDSON, L. R. **Hydatid Cysts of the Lung.** *J. Thoracic Surgery.* 1944, Dec., v. 13, No. 6, 471–510, 22 figs. [493 refs.]

ZIZMOR, J. & SZUCS, M. M. **Echinococcus Cyst of the Heart.** *Amer. J. Roentgenology & Radium Therap.* 1945, Jan., v. 53, No. 1, 15–19, 3 figs. [11 refs.]

KOURÍ, P. Tercer informe en relación al Inermicapsifer cubensis (Kouri 1938) Kouri 1939. [**Third Communication on** *Inermicapsifer cubensis.*] *Rev. Med. Trop. y Parasit.* Habana. 1944, Sept.-Oct.-Nov.-Dec., v. 10, Nos. 5–6, 107–12. [23 refs.]

The author outlines the history of this cestode. Some 11 species of the genus have been found in rodents and African Hyracoidea, but *I. cubensis*, described by KOURÍ and BAER, is the first American species to be recorded. Baer suggested that it was introduced to South America from West Africa. Kourí here decides that *I. cubensis* is synonymous with *Raillietina cubensis*, *R. kouridovalis* and *R. loechesalavesi*. He also places all the South American equatorial species of *Raillietina* in the species *R. demerariensis* (*i.e.* this species is synonymous with *R. quitensis*, *R. luisaleoni*. *R. equatoriensis*, *R. brumpti* and *R. leoni*) [see also DOLLFUS, this *Bulletin*, 1940, v. 37, 214, and 1941, v. 38, 112].

The first human infestation with *I. cubensis* was discovered in 1930 by Hernández LOECHE and Alavez OLMO; by 1940 some 32 cases had been described [KOURÍ and RAPPAPORT, this *Bulletin*, 1941, 38, 113]; in the paper under review Kourí reports more than 70 cases up to 1944. The parasite is, he says, most frequent in the provinces of La Habana (more than 70 cases), Matanzas (8 cases), and Pinar del Río (5 cases). A piece of a cestode received in 1944 by the author from Lara State, Venezuela, is suspected to be *I. cubensis*. Most of the infested subjects have been children between one and two years old; the youngest was aged 5 months; three were aged 9–11 and two 18–35. All were whites except one negro. Usually each subject harboured only one cestode, but three expelled two and one expelled four. Usually the cestode is expelled spontaneously after a few months and it readily yields to simple purges or anthelmintics. This fact, the tender age of most of the subjects and the poor resistance of the proglottids and egg capsules to external conditions (they disintegrate outside the host in 24–48 hours) suggest that man is not a favourable host, that the normal host is a wild or domesticated animal and that the intermediate host is abundant, so that the eggs are eaten in the short time available before external conditions render them non-viable. Expeditions to the infested areas in Cuba failed to reveal the parasite in the 658 animals examined, most of which were mammals (oxen, sheep, goats, pigs, horses, cats, dogs, ferrets, Cuban rats, bats and frogs); nor was an intermediate host discovered among the acari, insects and crustacea examined. Nor have PÉREZ VIGUERAS and ROCELIO ARENAS, in the course of their examination of large numbers of Cuban animals, found this cestode. The search for the normal and intermediate hosts provided much other information about Cuban parasites. An experimental attempt to infest man with the gravid proglottids of *I. cubensis* and with plerocercoids of *Diphyllobothrium mansoni* were both negative. Most of the animals examined were heavily parasitized by cestodes, nematodes and protozoa, but the bats, frogs and ferrets were free from intestinal helminths. The unknown life-history of *Platynosomum fastosum* of the liver of the cat, which is common in Cuban cats, was studied and also that of *Diphyllobothrium mansoni*, which occurs in 100 per cent. of Cuban cats in certain rural areas, although it is absent from the town cats.

None of the 366 rats examined harboured *Trichinella spiralis*, which has not yet been reported from Cuba; but these rats did not come from slaughter-houses. *G. Lapage.*

FERRO-LUZZI, G. Il problema dell'anchilostomiasi in Eritrea. [**Ankylostomiasis in Eritrea.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1944, v. 4, No. 2, 369–75. English summary (6 lines).

Up to the present, states the author, the problem of ankylostomiasis has not arisen in Eritrea ; any cases there might be, and they were rare, were imported. Now, however, owing to the movement of troops, immigration of agricultural and industrial workers, of natives from neighbouring districts, the passage of coloured troops from the Sudan, India and other places where ankylostomiasis prevails, parts of the country are becoming endemic foci of infection.

The author has made examinations of very small numbers in three places within 15 kilometres of Asmara ; he used the Willis technique. In one, Amba Derho, he examined 13 apparently healthy persons and found nine passing the ova ; in another, Gheremi, 8 kilometres from the last, he found 16 positive out of 30, and in a third, Beleas, " some distance from both these," one positive out of ten, that is 26 positive in 53 persons examined. [He calls the respective figures, 69, 53 and 10 per cent.] The only symptom present, except the passage of ova, was a mild degree of eosinophilia [number not given] and how far this was due to the hookworm is conjectural because other helminthic infestations—*Enterobius*, *Ascaris* and *Taenia*—are very common among Eritreans. In order to prevent the condition becoming ineradicable the author pleads for the usual methods of prevention to be undertaken without delay. *H. Harold Scott.*

JOHNSON, P. A. G. **Filariasis. Clinical Findings in 189 Cases.** *U.S. Nav. Med. Bull.* 1944, Nov., v. 43, No. 5, 950–54.

From July to November 1943, observations were made on 189 cases of filariasis in United States marines who had returned from the South Pacific area to the Marine Corps Base at San Diego [California]. The men had served in Samoa, Wallis Island, or in both these places. The observations are presented in a table which shows the relative frequencies of the chief symptoms and signs, the periods of service with and without symptoms, and the number of days in hospital and on leave.

As regards prognosis, it was found that the longer the time spent in the U.S.A., the greater was the improvement ; it was very marked in patients who had been in the U.S.A. for over 107 days. Great importance is attached to special attention being given by medical officers early in the disease, particularly for its beneficial psychological effect on the patient. Rest in bed, light duties, and an explanation to the patients of their case assured them as to their ability to work and reduced their requests for prolonged hospitalization. *J. F. Corson.*

VENNER, R. B. **Filarial Problem on Nanumea.** *U.S. Nav. Med. Bull.* 1944, Nov., v. 43, No. 5, 955–63.

Nanumea, the most northern of the Ellice Islands, was occupied by American Marines on September 4th, 1943. The native population of 800 had been removed in August to the neighbouring island of Lakena, 2½ miles away, which had been largely used by the people of Nanumea for farming. The Marines had previously lived in Samoa for many months, so investigations on filariasis were limited to observations on the local mosquitoes and on the natives. Mosquitoes and their larvae were collected and notes were made of the conditions under which they lived. The natives were examined by questions, physical examination and by taking blood films. The survey lasted for a month and produced two unexpected results : (1) there was more filariasis, especially in a chronic stage, than was expected ; (2) both the Marines on Nanumea and the natives on Lakena were

providing breeding places for mosquitoes. As the natives had lived in other places which were endemic areas of filariasis, there was no proof that any of them had acquired the disease in these islands.

The adult mosquitoes found were *Aëdes aegypti* and *A. scutellaris pseudoscutellaris* in about equal numbers; their larvae were found in rain-water in barrels, coconut shells, hollow tree stumps, &c., in Nanumea, while in Lakena they were chiefly found in pits used for growing an edible root called "taro" (*Colocasia esculenta*). Larva of *Culex annulirostris* were also found in both islands.

Staining of blood films was not very successful at first, but of 65 well stained films, microfilariae were found in 33.

Antimosquito measures, suitable to the local conditions, were recommended to the authorities concerned. *J. F. Corson.*

YRD, E. E., ST. AMANT, L. S. & BROMBERG, L. **Studies on Filariasis in the Samoan Area.** *U.S. Nav. Med. Bull.* 1945, Jan., v. 44, No. 1, 1–20, 9 figs. & 1 graph.

The authors made various observations and experiments on filariasis in the Samoan Islands from April 1943 to February 1944. They recognized seven species of mosquito (there are said to be 10): *Aëdes scutellaris* var. *pseudoscutellaris*, *A. aegypti*, *A. samoana* (*kochi*?), *A. vexans*, *Culex fatigans* (*quinquefasciatus*), *C. annulirostris*, and *C. sitiens*. Caught specimens of these, except *C. sitiens*, were dissected for larvae of *Wuchereria bancrofti* with the result that they were found only in *A. scutellaris* var. *pseudoscutellaris* and *C. fatigans*: 2·9 per cent. of 6,634 specimens of the former species and 7·4 per cent. of the latter had larvae, but, in *C. fatigans*, they were not beyond the 7-day stage of development, More than 15 per cent. of the former species had larvae in the infective stage; many had dual or triple infections.

Laboratory-bred mosquitoes of these two species were given a single feed on the same person; *A. scutellaris* var. *pseudoscutellaris* showed infection in over 80 per cent., and of those which survived for 15 days, 80 per cent. had larvae of the infective stage. *C. fatigans* showed infection in 29 per cent. but of 25 which lived for 15 days, only one had larvae of the infective stage. Early larval stages were found in feeding experiments with *A. aegypti* and *C. annulirostris*, but no infective stages were seen.

The habits of the adult mosquitoes were observed, with results in agreement with those of previous workers [see O'CONNOR, this *Bulletin*, 1923, v. 20, 5 and 891; BUXTON, *ibid.*, 1927, v. 24, 941]. The two commonest mosquitoes are *A. scutellaris* var. *pseudoscutellaris* and *A. samoana*; the former bites by day, breeds in a great variety of casual collections of water—coconut shells, tin cans, rot-holes, &c., and does not fly far (rarely more than 100 yards) from its breeding place; the latter bites at night, and breeds only in the axils of the taro, mat grass, and pandanus plants.

The authors recommend antimosquito measures and segregation of troops from infected natives as well as native villages as far as may be practicable and in accordance with local conditions. *J. F. Corson.*

GLAUSER, F. **Filariasis in Returning Marines.** *U.S. Nav. Med. Bull.* 1945, Jan., v. 44, No. 1, 21–6, 4 charts.

"The case histories of 172 Marines who had served in the Samoan Islands were reviewed, the men themselves examined, and some treated." The enquiry was mainly a numerical analysis and included such details as the number of men who developed symptoms while still on the islands, the incidence in individual islands, the number of months between landing and the first appearance of symptoms, the time of day or night when symptoms first appeared, the

mode of onset and the part of the body which first showed signs, and the results of physical examination. Most of the observations agree with those made by other workers on Service men who have returned to America from South Pacific islands. Allergic signs, such as localized itchy swellings, were present in 32, and spindle-shaped swellings were seen in the ulnar aspect of the forearm and over the calf. The author found great variation in all the points examined. He concluded that symptoms were exaggerated and that "psychic trauma appeared to play a considerable part." The disease was not disabling and did not interfere materially with duty, and hospitalization was unnecessary; recurrences were frequent but not important. The disease caused neither impotence nor sterility, and there seemed to be no probability of elephantiasis developing. No form of treatment was effective [see also this *Bulletin*, 1944, v. 41, 303, 304, 860 and 956; *ibid.*, 1945, v. 42, 53]. *J. F. Corson.*

ZUCKERMAN, S. S. & HIBBARD, J. S. **Clinicopathologic Study of Early Filariasis with Lymph Node Biopsies.** *U.S. Nav. Med. Bull.* 1945, Jan., v. 44, No. 1, 27–36.

The authors excised lymphatic glands in 62 cases of filariasis in Samoa [the patients probably belonged to American military personnel though this is not definitely stated]. The glands were removed from patients in various stages of the disease and they had various anatomical relations with areas of acute lymphangitis. The histological picture seen in sections was fairly constant, but the authors classified the cases into four groups based on histological variations: (1) adult filariae present inside or outside the node; (2) no adult filariae present but there was dense eosinophilic infiltration; (3) neither adult filariae nor eosinophilic infiltration present but the gland was anatomically connected with acute lymphangitis; (4) like (3) but without anatomical connexion with acute lymphangitis, which, however, was present elsewhere in the body.

The sections showed "marked hyperplasia of the reticulo-endothelial cells and a prominent hyperplastic and obliterative endolymphangitis," even in Group (4). This suggests that the pathological changes represent a "generalized reaction to the toxic or metabolic products of the worm itself, not to its disintegration products." There was much variation in the degree of eosinophilic infiltration; its presence in Group (1) where it was intense, and its absence from Groups (3) and (4) suggest a direct association with the presence of filariae. There was no evidence that lymphangitis was due to bacterial infection.

The authors concluded that biopsy is unnecessary for diagnosis in most cases but is useful to confirm a diagnosis in clinically atypical cases. *J. F. Corson.*

HARTZ, P. H. **Contribution to the Histopathology of Filariasis.** *Amer. J. Clin. Path.* 1944, Jan., v. 14, No. 1, 34–43, 9 figs.

In the abstract of this paper published in this *Bulletin*, 1944, v. 41, 955, line 19, the sentence "There is no necrosis when the microfilariae are intact" should read "Necrosis was never seen when the filariae were intact." Throughout the paper the changes described are those brought about in connexion with adult worms.

GOLDMAN, L. **American Onchocerciasis.** *Arch. Dermat. & Syph.* 1944, Dec., v. 50, No. 6, 385–93, 6 figs. [13 refs.]

This paper is a useful general account of onchocerciasis in America only, which should be useful to those who are unable to consult the more detailed accounts in standard textbooks of tropical diseases. There are two good photographs

of cross sections of *Onchocerca* nodules. Among the diagnostic methods briefly discussed is the method of feeding non-infested Simuliid flies upon persons suspected of having onchocerciasis and later examining the flies for microfilariae. The author's brief comparison of onchocerciasis with infestations with *Wuchereria bancrofti* will be useful to those who are looking out for these two infestations at the present time among Allied troops in the areas where these diseases occur. *G. Lapage.*

GAASE, A. Der Trichinellen-Antikörpernachweis im Liquor cerebrospinalis und der Nachweis von Trichinellentoxin in der Hirnsubstanz durch die Komplementbindungsreaktion. [**The Demonstration of** *Trichinella* **Antibodies in the Cerebrospinal Fluid and the Demonstration of** *Trichinella* **Toxin in the Brain Substance by means of the Complement-Fixation Reaction.**] *Münch. med. Woch.* 1943, Oct. 22, v. 90, No. 42/43, 612.

The author records the history of a patient who developed, 18 days after eating pork, a haemorrhagic diarrhoea and swelling of the eyelids. There was, 12 days later, an eosinophilia of 50 per cent. and a complement fixation test, done about 15 days after the first appearance of symptoms, was positive; on the 39th day it was strongly positive. The condition was complicated by tonsillitis, with fever, marked headache in the right temporal region, some deafness and impairment of sight; the patient became stuporose, with stiffness of the neck and positive Kernig and Brudzinski signs. Lumbar puncture removed a clear cerebrospinal fluid which gave a strongly positive test with *Trichinella* antigen. The patient died, but death was attributed to generalized sepsis and not to trichiniasis. Haemolytic streptococci were recovered at autopsy from the swollen spleen and there were metastic abscesses in the heart muscle and kidney with a chronic parietal endocarditis and haemorrhagic infarcts in the spleen and left kidney. Trichinellae were found in sections of the muscles of the neck, upper arm, thigh and in the diaphragm, but not in the oedematous brain substance, which was examined both by digestion in pepsin and HCl and by crush preparations.

Gaase fed guineapigs with the brain substance of this human subject and even two days later the guineapigs gave a positive complement fixation reaction to *Trichinella* antigen and this persisted. Earlier [see *Bulletin of Hygiene*, 1943, v. 18, 209] Gaase had found that guineapigs fed with trichinized meat showed a positive complement fixation reaction as early as three and five days after the feeding. He has also observed the same result after intraperitoneal injection of *Trichinella* antigen into guineapigs without the presence in them of viable *Trichinella* larvae. He suggests that, if there were any trichinellae in the brain substance of this human subject, they were too few to cause any symptoms in the guineapigs fed with it; but he thinks it more probable that the brain substance contained *Trichinella* toxins and that these caused the production of antibodies, so that the early positive complement fixation reaction was obtained.

Gaase explains the nervous symptoms as being due to the *Trichinella* toxins. The same view has been expressed by others (BORSCH [BOSCH], H., *Münch. med. Woch.*, 1931, v. 78, No. 11, 436, and FLEISCHMANN, P., *Deutsch. med. Woch.*, 1930, v. 56, No. 16, 648). The presence of *Trichinella* in the cerebrospinal fluid and brain substance has been recorded by MATOFF, K., *Zschr. infekt. Krankh. Haustiere*, 1940, v. 56, [no page] and FROTHINGHAM, cited by SEIFERT, O., *Handb. der pathog. Mikroorganismen*, 1929, v. 6, Pt. 2, 1011). Gaase claims that the observations here recorded afford further evidence of the value of the complement fixation reaction for the diagnosis of trichiniasis. *Trichinella* antigen obtained from pigs is superior to that obtained from rats [*cf.* GAASE, A., *Bulletin of Hygiene*, 1943, v. 18, 210, and the reverse evaluation

of LINNEWEH, F. and HARMSEN, this *Bulletin*, 1943, v. 40, 935. See also other papers in the *Bulletin of Hygiene* and this *Bulletin*, 1944, v. 41, 716].

G. Lapage.

WENDEROTH, H. Ueber Schäden des Kreislaufapparates bei Trichinose. [**Circulatory Lesions in Trichiniasis.**] *Deut. Militärarzt.* 1942, Nov., v. 7, No. 11, 687–91, 3 figs.

Trichinella infection is common, says the author, in the German armies in the east of Europe because Russian pigs are heavily infested. [Before the war, and probably now also, Germany itself was one of the countries where trichiniasis was rife.] In the present paper he deals with 58 cases: 15 very severe (8 ending fatally), 28 of average severity, 11 mild, and 9 showing very slight symptoms, diagnosed as "rheumatism," but with eosinophilia of 10 per cent. or so. Of the changes occurring in the blood-vascular system he notes increased corpuscular sedimentation rate, increased pulse-rate, but usually not higher than the accompanying fever would explain except in very severe cases where the toxic condition is leading to collapse and heart failure; oedema is due to toxic effects on the capillaries and connective tissue. One of the most important lesions of the circulation is thrombosis; cases are referred to in which this occurred in lung, mesenteric veins, the sigmoid sinus, and the saphenous vein with pulmonary infarct. *Trichinella* was not seen in the myocardium—the heart muscle has no sarcolemma—but myocarditis with eosinophilia and round-cell infiltration is common, or focal lesions with interstitial infiltrations by lymphocytes, plasma cells and a few leucocytes, or oedema of the connective tissue as in cardiac dropsy. Electrocardiographic changes—three electrocardiograms are reproduced—are explained by a widespread myocarditis of multiple small foci, which soon clear up when the helminthic infestation ceases.

H. Harold Scott.

HAEMATOLOGY.

MOORE, C. V., VILTER, R., MINNICH, V. & SPIES, T. D. **Nutritional Macrocytic Anemia in Patients with Pellagra or Deficiency of the Vitamin B Complex.** *J. Lab. & Clin. Med.* 1944, Dec., v. 29, No. 12, 1226–55, 7 figs. [64 refs.]

This important paper describes clinical and laboratory studies in macrocytic anaemia associated with pellagra and other manifestations of vitamin B complex deficiency. From 1940 to 1943, 56 patients with this syndrome were observed in the Nutrition Clinic of the Hillman Hospital, Birmingham, Alabama, and 25 of them were selected for special study.

The patients were white subjects, mostly over 50 years of age, males being three times as frequent as females. They all had subsisted for years on diets grossly deficient in animal protein. The clinical manifestations related mainly to the skin, gastro-intestinal tract, cardiovascular system and peripheral nerves. Signs of pellagra, ariboflavinosis or beriberi were present in most of the patients. The skin in all cases displayed hyperpigmentation, roughness and dryness, but never had the fine texture and lemon tint of Addisonian pernicious anaemia. Persistent diarrhoea was almost a constant feature.

The anaemia was macrocytic and megaloblastic, the initial red cell counts ranging from 1·14 to 2·33 millions per cmm. The peripheral blood and sternal bone marrow were invariably indistinguishable, cytologically, from those of

Addisonian pernicious anaemia. The cases differed, however, from the latter condition in the following respects :—

(1) Free hydrochloric acid was found in the gastric juice on at least one occasion in 21 of the 25 cases. (2) The icteric index and, with two exceptions, the serum iron values were within normal limits. (3) Experimental evidence indicated that intrinsic factor was present in the gastric juice.

Features distinguishing the syndrome from sprue were the normal faecal fat values and the absence of significant abnormalities on barium meal radiological examination.

Appropriate treatment was followed by marked clinical improvement and haematological remission. Those patients who corrected their former faulty dietary habits remained well without further treatment. Failure in this respect, however, resulted in relapse in 18 to 24 months.

Niacin [nicotinic acid], thiamin, riboflavin, calcium pantothenate, pyridoxin, inositol, para-amidobenzoic acid and choline, given together daily, both orally and parenterally, caused amelioration of many of the clinical manifestations of avitaminosis but exerted no haemopoietic effect.

The daily administration by mouth of 200 gm. of ground beef muscle or of an 80 per cent. alcoholic extract equivalent to 250 gm. of beef or of crude liver extract, resulted in suboptimal reticulocyte responses and eventually in moderate rises in the red cell counts. Replacement of this therapy by daily intramuscular injections of highly purified liver extracts was invariably followed by secondary reticulocyte responses and marked acceleration of red cell regeneration.

The presence of intrinsic factor in the gastric juice of two patients was demonstrated by biological assay : samples of the patients' gastric juice added to raw beef and administered to cases of Addisonian pernicious anaemia, resulted in reticulocyte responses.

In another experiment a patient was given beef extract orally with a resulting reticulocyte response. When the beef extract was replaced by an equivalent amount of beef to which normal gastric juice had been added, a secondary rise was noted. A maximal reticulocyte response and rapid red cell regeneration only occurred, however, when injections of purified liver extract were substituted for the earlier treatment.

The authors conclude from their experiments that the pathogenesis of these cases of nutritional macrocytic anaemia seems to depend on the existence of a prolonged dietary deficiency of extrinsic factor, associated in many instances with poor absorption from the intestinal tract, with or without inadequate production [but not complete lack] of intrinsic factor by the gastric mucosa. Final proof awaits the isolation and clinical trial of extrinsic factor.

The possible relationship of this form of nutritional macrocytic anaemia to sprue and to tropical macrocytic anaemia is discussed. Attention is drawn to the ease with which this syndrome may be confused with Addisonian pernicious anaemia, since patients may show intermittent achlorhydria, and it is suggested that the syndrome may be more common in areas where pellagra is endemic than has formerly been realized.

[This paper should be read in the original by all investigators in this field, since it breaks new ground and provides a valuable contribution to the subject.

The invariable therapeutic success obtained with highly purified liver extracts administered parenterally is of considerable interest in view of conflicting reports on this point from India and elsewhere. It should be noted, however, that in the present work, the liver extracts were usually given in massive dosage and that in many cases the patients had previously been on high protein and high vitamin diets.] *L. J. Davis.*

VOORHIES, N. W. & SLOAN, F. R. **Mediterranean Anemia.** *J. Amer. Med. Ass.* 1944, June 3, v. 125, No. 5, 352–4, 4 figs. [12 refs.]

Captain Voorhies and Major Sloan describe a case of splenomegaly and mild anaemia, associated with skeletal changes, in a young man of 20, as a case of Mediterranean anaemia. The patient was born of Sicilian parents. [Unfortunately, as his eyes are covered, it is impossible to judge of his mongoloid appearance and the reproductions of the X-rays are not clear enough to study the bone changes present.] The authors themselves admit that the vertical striations connecting the inner and outer table of the skull bone, which is so typical a finding in this disease, were not present. [The authors' diagnosis should be regarded as not proven.] *Janet Vaughan.*

BAUER, J. & FISHER, L. J. **Sickle Cell Disease with special regard to its Non-anemic Variety.** *Arch. Surgery.* 1943, Dec., v. 47, No. 6, 553–63. [Refs. in footnotes.]

Among seven cases of sickle cell disease reported in detail, Professor Bauer and Dr. Fisher found five in whom the diagnosis had not even been suspected during life but was made at post-mortem. They emphasize the importance of recognizing that anaemia is not an obligatory sign of sickle cell disease. Serious consequences may result from circulatory stasis of the sickle cells in the small blood vessels rather than from the anaemia. Persons with the sickle cell trait are, the authors consider, potential candidates for sickle cell disease with or without anaemia. Many cases, however, of sickle cell disease are not diagnosed correctly because the sickling phenomenon is not looked for. The authors suggest that it is imperative that the misnomer " sickle cell anaemia " should be abandoned and the term " sickle cell disease " be used instead. They do not agree with WINTROBE that the sickle cell trait is of little clinical significance, but suggest that a person with this trait has one of the following chances :— (*a*) he may have the sickle cell trait without further consequences ; (*b*) he may develop sickle cell disease as characterized by typical post-mortem changes particularly in the spleen without, however, any impairment of health ; (*c*) sickle cell disease may develop, causing circulatory stasis in various organs, which may produce abdominal or neurological symptoms, pain of bones and joints and other manifestations of an impaired circulation ; (*d*) a more or less severe anaemia may develop ; (*e*) an anaemia due to a cause other than the sickle cell trait may develop ; (*f*) other constitutional abnormalities may be present which may result in ill health. Since the sickle cell trait is commonly found in American negroes, the authors consider that all negro patients in both medical and surgical services [wards] should be tested as a routine for sicklaemia, and that all negroes in the armed forces should also be tested. *Janet Vaughan.*

WINSOR, T. & BURCH, G. E. **Diagnostic Physicochemical Blood Tests in Sickle Cell Anemia.** *Amer. J. Med. Sci.* 1944, Feb., v. 207, No. 2, 152–60, 2 figs.

In a study of the sedimentation rate in sickle cell anaemia Dr. Winsor and Professor Burch noted that CO_2 causes a marked retardation, and oxygen a marked acceleration in the rate. The sedimentation rate is not affected to the same degree in other conditions and the authors have described simple tests making use of these phenomena [the effects of O_2 and CO_2] which they consider are 98 per cent. reliable in the identification of sickle cell anaemia. For details of the method and statistical analysis of the data on which their conclusions are based reference should be made to the original paper. *Janet Vaughan.*

DERMATOLOGY AND FUNGOUS DISEASES.

DENENHOLZ, E. J. & CHENEY, G. **Diagnosis and Treatment of Chronic Coccidioidomycosis.** *Arch. Intern. Med.* 1944, Nov., v. 74, No. 5, 311–30, 10 figs. [Refs. in footnotes.]

This important paper, dealing with chronic coccidioidomycosis mainly from the standpoint of clinical pathology, should be read in the original. The authors emphasize the bizarre character of the symptomatology of the disease and stress the value of accessory aids in diagnosis. They studied a series of 44 cases diagnosed as coccidioidomycosis, in only 14 of which, however, was the diagnosis confirmed mycologically. These cases are used to illustrate the authors' seven steps in diagnosis, which are as follows :—

(1) *History* : Exposure to infection in a known endemic area of the disease, or the record of an illness compatible in its symptoms with acute coccidioidomycosis.

(2) *Cutaneous tests* : Coccidioidin injected intradermally in 0·1 cc. volume of two concentrations, 1/1000 and 1/100. The results are read at the end of 48 hours and recorded as positive if the area of induration and erythema is, or exceeds, 0·5 cm. in diameter. A reaction measuring 0·5 to 1·0 cm. in diameter is recorded as +, 1·0 to 2·0 cm. as ++, exceeding 2·0 cm. as +++, and extensive induration with vesiculation or necrosis as ++++. The test is highly specific and indicates coccidioidal infection past or present. A positive result from patients from whom a previous test, made before the onset of the current illness, had given a negative result, is of special diagnostic value. A negative result usually excludes infection except in severe and overwhelming infections.

(3) *Culture and animal inoculation* : Culture from pus is usually easy, but, when other microorganisms are present, as in the case of sputum, it is advisable to use a selective medium such as the following :—

	Per cent.
Ammonium chloride	1·0
Tribasic potassium phosphate	0·8
Agar	2·0
Copper sulphate (add after autoclaving)	0·04

Inoculation into mice or guineapigs is desirable to establish the identity of the fungus isolated.

(4) *Tests of the patient's serum* : Precipitin and complement-fixation tests, with coccidioidin antigen, are valuable in diagnosis and in prognosis. In the earlier stages of the disease the precipitin reaction is usually found stronger than the complement fixation test, but it tends to diminish earlier in the stage of recovery. A diminishing precipitin reaction with a rising complement-fixation titre is of bad prognosis and usually heralds dissemination of the disease. Focalization of the disease is associated with the disappearance of both reactions or the persistence of a feeble complement-fixation reaction.

(5) *Examination of tissue* : Demonstration of the parasitic "spherules" in tissue removed at biopsy is frequently difficult and it is advisable to combine this examination with culture and inoculation into animals of the tissue material or, if necessary, of the culture obtained.

(6) *Examination of the blood* : There is no significant alteration in numbers or proportions of the leucocytes in the chronic stage of the disease. The sedimentation rate is an important guide to progress ; it increases during the active stages of the disease and its fall to the normal, several weeks or months after the febrile reaction has subsided, is a good indication of recovery.

(7) *Radiography*: X-ray examination of the chest is of the greatest value in detecting the pulmonary lesions and especially the associated involvement of the bones.

The authors conclude with a discussion on treatment, from which it seems that the best course is rest, as complete as possible, until the symptoms subside. The results from chemotherapy have been disappointing, but immune-therapy, using the blood from a recovered case, seems worth further trials.

J. T. Duncan.

CALLAHAN, W. P., Jr. **Spontaneous Histoplasmosis occurring in a Dog.** *Amer. J. Trop. Med.* 1944, Nov., v. 24, No. 6, 363–6, 2 figs. [14 refs.]

DE MONBREUN [this *Bulletin*, 1940, v. 37, 533], was the first to diagnose naturally acquired histoplasmosis in the dog. THURINGER [this *Bulletin*, 1944, v. 41, 774], described the second case and the present auther adds the third. With this dog, as with the other two, the source of the infection is not known, but shortly before the onset of symptoms the animal had been boarded at kennels in St. Louis, in which city three cases of histoplasmosis in man had previously been reported. The diagnosis was made from the examination of tissue sections three months after the animal's death, so it was not possible to obtain a culture of the causative fungus. However, excellent sections of spleen and mesenteric lymph node showing clearly the characteristic lesion of histoplasmosis place the diagnosis beyond question. The author refers to the earlier reports by SANGIORGI (*Pathologica*, 1922, v. 14, 493), and SHORTT (*Indian J. Med. Res.*, 1923, v. 10, 908), of yeast-like bodies in the organs of mice, and by LEVINE *et al.* (*Cornell Veterinarian*, 1938, v. 28, 249), of a similar kind of parasite in the organs of a ferret. From the descriptions given of the lesions and the associated microorganisms, competent observers have concluded that these animals may have been suffering from infection by a species of *Histoplasma*. The probable existence of an animal reservoir of histoplasmosis must be considered.

J. T. Duncan.

TROPICAL OPHTHALMOLOGY.

A REVIEW OF RECENT ARTICLES. XLV*.

Trachoma.—The treatment of trachoma with special reference to local sulphonamide therapy is discussed by SORSBY[1]. A series of 200 patients were treated in the White Oak Hospital and the Eastern Fever Hospital under ideal conditions for continuous observation, and allowed a certain amount of experimentation in treatment. Before the advent of the sulphonamides only three preparations (of a multitude suggested by the literature on the subject) were found useful; saturated solution of quinine bisulphate, mercury perchloride, and Trachocid. Saturated solution of quinine contains about 2 per cent. of the salt in solution. Mercuric chloride is generally used as a paint in ½-2 per cent. solution in glycerine. Trachocid is a proprietary preparation said to contain bee-venom, and manufactured by the State Serum Institute in Vienna. It is recommended for use by injection under the conjunctiva. Sorsby's classifi-

* For the 44th of this Series see Vol. 41, pp. 1060–1062.

[1]SORSBY, A. The Treatment of Trachoma with special reference to Local Sulphonamide Therapy. *Brit. J. Ophthalm.* 1945, Feb., v. 29, No. 2, 98–102.

cation of trachoma was based on therapeutic requirements. Stage I was moist active trachoma with sodden fornices and formation of follicles. Stage II represented a moist tarsal conjunctiva, ideally without follicle formation and but little swelling of the fornix. Stage III stood for Stage II, but with the conjunctiva no longer moist; it was trachoma in the process of healing. Treatment aimed at the rapid conversion of Stage I into Stage II. The passage of Stage II to Stage III was a more prolonged process. The sulphonamides have proved to be valuable agents in trachoma therapy. They were at first used by oral administration and later by local application. The following procedures were carried out: (1) Full doses of sulphapyridine, sulphathiazole or sulphamezathine (the last being the best as it is least toxic) for 10 days. (2) Mechanical expression of the follicles and the contents of the fornix under local anaesthesia. This might have to be repeated after 7–14 days. (3) The conjunctival surface thus treated was painted immediately with saturated solution of quinine, repeated three times daily for 7–14 days. Two alternative methods of treatment are open:—(1) Painting the lids twice daily with glycerine solution of mercury perchloride ½–1 per cent. (in the case of children) or 1–2 per cent. (in adults); the paintings should be continued till the eye becomes dry. More recently, better results have been obtained by (2) painting the lids with 30 per cent. sodium sulphacetamide solution ("Albucid") once daily and instilling sodium sulphacetamide ointment, 6 per cent., three times daily. The eye rapidly becomes dry, all follicles disappear, and the fornix looks almost normal. Stage III is characteristically a dry eye. In most cases nothing need be done, though there is no harm in using ¼ per cent. copper sulphate or zinc sulphate drops. The continued use of sulphacetamide ointment is helpful. Pannus regresses with proper management of the conjunctival lesion. Massage of the upper third of the cornea with a small glass rod is a useful procedure. In more active corneal lesions atropine is indicated and a course of oral administration of some sulphonamide may be necessary. For dense pannus and active corneal lesions subconjunctival injections of 0·5 cc. of the mixed solution of Trachocid at 2 or 3 points in the circumference of the cornea were found helpful. If a corneal ulcer develops, "carbolising" with 30 per cent. sulphacetamide solution may be carried out.

Sorsby points out that the application of the copper stick is a barbarous procedure, and most ophthalmologists will agree that it has no place in the modern treatment of trachoma and should be discarded.

The author is strongly of opinion that sulphonamides are specific against the as yet unisolated trachoma virus, and that expression, with the local application of sulphacetamide, can bring about a clinical cure of trachoma.

Gilford[2] reports the treatment of four Russian patients suffering from trachoma with penicillin drops (16,000 units per cc.) given three-hourly in both eyes for three days. These cases showed well-marked vascularization of the cornea and pannus. All four "resolved rapidly under penicillin treatment. It still remains to be proved that it has a specific effect on the 'virus' causing the disease, or whether the effect is only transitory, clearing up the secondary infection present in all these cases."

The investigation of trachoma and some observations on blindness in Cyprus are discussed by Shelley[3], who states that it is there a family and social disease, more prevalent in the villages than the towns and practically non-existent in the mountain districts. He found that either the whole family was

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[2]Gilford, G. H. Treatment of Trachoma with Penicillin. [Correspondence.] *Brit. Med J.* 1945, Feb. 17, 232–3.

[3]Shelley, J. E. Investigation of Trachoma and some Observations on Blindness in Cyprus. *Acta Med. Orientalia* (*Palestine & Near East Med. J.*). 1945, Jan., v. 4, No. 1, 21–6.

infected or the whole family was free from trachoma. If the mother of the family is suffering from trachoma in an infective stage when the first child is born, there is not much chance of this child and subsequent children escaping the disease. Hence the importance of ante-natal treatment for trachoma in expectant mothers. Owing to improved social conditions under which the younger generation has grown up, and to better treatment in schools and clinics, the incidence and severity of the disease have decreased. In his opinion trachoma *per se* is not a cause of blindness and does not cause very serious economic loss in the life of the community. Blindness in Cyprus is not increasing and the present rate per 100,000 is 212. It is not in any way comparable with that found in Egypt and Palestine. The chief cause is acute Koch-Weeks conjunctivitis.

BERNASCONI[4] reports his results of a campaign against trachoma amongst school children in Argentina between the years 1937 and 1940. Some 3,000 of these were found to be affected. Over a period of 3 years, very considerable improvement was found with the usual local remedies of copper sulphate and zinc sulphate solutions. During the investigation he noticed that in schools in which the nutritional level of the children was high, the proportion affected with trachoma was low, and *vice versa*. As the malnourishment was due to a vitamin A deficiency, the author therefore treated a small number of incipient cases of trachoma with a preparation containing vitamins A and D by the mouth, without local applications. Complete cure after 3–4 months was obtained in some cases whilst others were greatly improved. He also noticed that healthy school contacts of 42 cases of trachoma, during the period of his observation, remained unaffected in spite of very close association.

In a letter to Professor G. S. Wilson the author emphasizes the fact that trachoma is common in communities whose diet is poor, and rare in those whose diet includes fresh foods—carrots, tomatoes, lettuce, etc., and that as a result of his observations trachoma can be regarded as a deficiency disease and no longer be classified as infective. [Although nutrition undoubtedly plays a part in the aetiology of trachoma, good hygiene and efficient medical school service are also important points in preventing the disease, which most ophthalmologists regard as infectious.]

Ophthalmia Neonatorum.—SORSBY and HOFFA[5] report 47 cases of ophthalmia neonatorum treated by the local application of penicillin in the form of drops. "Concentrations of 500, 1,000, 1,500 and 2,500 Oxford units per cc. were used. An increasing proportion of satisfactory results was obtained with increase of the concentration of the drops used. . . . In adequate concentration, penicillin appears to be effective against all the common causal organisms of ophthalmia neonatorum, including the virus of inclusion blennorrhoea. It is likely that some forms of ophthalmia neonatorum respond more readily to penicillin than others. On the whole the results are of the same order as those obtained with the sulphonamides."

Penicillin Therapy in Ocular Infections.—With the employment of penicillin in the past year a significant advance has been made in the chemotherapy of

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[4]BERNASCONI, E. M. Observaciones que contribuyen a la etiologia del tracoma. [Observations on the Aetiology of Trachoma.]

——. Confirmando mis observaciones en el tratamiento del tracoma. [Confirmatory Observation on the Treatment of Trachoma.]

[Reprint of two papers presented at the First and Second Congresses of Medicine in October 1941 and May 1943 respectively, Santiago del Estero, with later Appendices.] 26 pp.

[5]SORSBY A. & HOFFA, Elizabeth. Local Penicillin Therapy in Ophthalmia Neonatorum. *Brit. Med. J.* 1945, Jan. 27, 114–15.

ocular infections. BELLOWS[6] considers that penicillin is superior to the sulphonamides in that it is effective in the presence of pus and does not inhibit the growth of corneal epithelial cells, nor promote vascularization and scarring of the cornea.

Unlike the sulphonamides, penicillin is ineffective when administered orally. Therefore it should be given parenterally or locally. It must be given in massive doses parenterally to reach a measurable concentration in the body tissues and fluids. For deep infections of the eye and retrobulbar tissues, " the recommended procedure is the administration of 100,000 units of penicillin (dissolved in 1,000 cc. normal saline solution) by a continuous intravenous drop for 17 hours. This is followed by intramuscular injections of 1,250 units in 2 cc. saline every 3 hours, day and night, for 48 hours." " In serious infections where penicillin is indicated parenterally, it should be administered in much larger doses than those considered adequate up to the present time." The solution for local application, as in the case where penicillin is administered parenterally, must be fresh, and the strength most frequently employed was one containing 2,500 units of penicillin per cc. " A drop of the solution was instilled into the conjunctival sac every hour, day and night, except in the less serious cases, in which the drops were used during the waking hours only. Between applications, the penicillin solution was kept in an ice chamber. In cases of severe corneal ulcer the penicillin solution was applied in the form of a constant corneal bath for one hour or more several times a day. For this purpose a Barkan's plastic contact lens or some suitable substitute is satisfactory."

VON SALLMANN and MEYER[7] recently have advocated the use of iontophoresis in order to increase the concentration of penicillin in the anterior segment of the eyeball. It was found that penicillin reaches the ocular tissues within a few minutes after intravenous injection, and it appears in the ocular tissues in decreasing order of concentration listed as follows :—extraocular muscles, sclera, conjunctiva, blood, tears, chorio-retinal layer, aqueous and vitreous humors, and cornea. It has never been detected in the crystalline lens. In this respect the lens is similar to the cerebrospinal fluid, brain and nerve tissues.

Local application of penicillin leads to a very high concentration of the drug in the tissues of the anterior segment of the globe. Penicillin was found to be effective in the clinical treatment of acute and chronic infections of the lids, conjunctiva and cornea, produced by penicillin-sensitive organisms. It was found ineffective in two cases of exudative choroiditis and in one case of gonorrheal irido-cyclitis. Susceptible individuals may become hypersensitive to penicillin.

Cavernous Sinus Thrombosis, treated with Penicillin.—Septic thrombosis of the cavernous sinus has a high mortality rate—almost 100 per cent. JOHNSTONE[8] describes a case of recovery after receiving 1,310,000 units of penicillin. Doses of 100,000 units were given either intravenously or intramuscularly twice a day. " The case illustrates the following points. In cavernous sinus thrombosis following staphylococcal infection of the skin, penicillin is probably the drug of choice and should if possible be used at the outset and continued until the infection is completely under control. Treatment should be continued at the earliest sign of relapse. If treatment with sulphathiazole fails after, say, 20–30 g. of the drug, it seems useless to persist in further administration. Probably sulphathiazole would be better used while awaiting supplies of

[6]BELLOWS, J. G. Penicillin Therapy in Ocular Infections. *Amer. J. Ophthalm.* 1944, Nov., v. 27, No. 11, 1206–18. [11 refs.]

[7]VON SALLMANN, L. & MEYER, K., with the technical assistance of Jeanette DI GRANDI. Penetration of Penicillin into the Eye. *Arch. Ophthalmology.* 1944, Jan., v. 31, No. 1, 1–7, 3 figs. [13 refs.]

[8]JOHNSTONE, D. F. Cavernous Sinus Thrombosis treated with Penicillin. *Lancet.* 1945, Jan. 6, 9–10.

penicillin, and stopped as soon as these became available." The author points out that " if in this case it had been possible to start penicillin therapy early and in adequate dosage, it is likely that rapid recovery would have ensued without complication. But the ultimate recovery suggests that even when a severe infection comes under treatment at a late stage, penicillin is worth a trial."

E. O'G. Kirwan.

FAMILIARI, P. Considerazioni clinico-sociali sulla diffusione del tracoma fra la popolazione indigena dell'Africa Orientale Italiana. [**The Spread of Trachoma among the Natives of Italian East Africa.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1944, v. 3, No. 1, 464–96. [55 refs.]

The clinical forms of trachoma and the social conditions amid which it prevails are much the same in Eritrea and Somaliland as elsewhere. The characteristics, so far as they apply to Italian East Africa, are detailed and discussed by the author. Trachoma is endemic in the country, but becomes epidemic in waves of shorter or longer duration and of greater or less intensity from time to time. ZANETTIN examined 8,000 individuals with eye affections in Asmara and found 70 per cent. of them suffering from trachoma. PERGOLA in 1937 found 61·2 per cent. among 1,338 at the Regina Elena hospital and 66·3 per cent. the following year ; between 1938 and 1942 in the Ophthalmic Department of the hospital trachoma accounted for 46 per cent. of the patients and 44 per cent. of eye operations were for the alleviation of cicatricial effects of the disease. It is noted that there are two peculiar characteristics of the indigenous trachoma : its benign onset and course, and the gravity of relapses and complications. The disease is, as usual, largely one attacking the poor and ill-nourished, while climate plays no small part—a relatively damp atmosphere, near the sea, with prevailing north-east winds and the almost perpendicular rays of the sun near the equator.

Debilitating diseases also predispose, in this area particularly malaria, ankylostomiasis and syphilis. The conditions amid which the people live are very unhygienic ; personal cleanliness is almost unknown, they hardly ever wash face or hands, and they live in dirt, more like animals and never give a thought to spread of disease and infection by contact. With such a people and in such circumstances to deal effectively with the disease is no light undertaking.

H. Harold Scott.

GILBERT, W. Ergebnisse der Sulfonamidbehandlung bei Trachom und anderen Augenerkrankungen. [**Results of Sulphonamide Treatment in Trachoma and other Diseases of the Eyes.**] *Med. Klin.* 1943, Oct. 29, v. 39, No. 43/44, 721–3.

This is a review article, speaking in general terms and giving few, if any, particulars. The author starts by acknowledging the difficulty of assessing the results of treatment of trachoma because some cases recover without any treatment, others have chronic sequelae and others again suffer from relapses. He does not express his own opinion or give his own experiences, but quotes from the literature and the reports of others. Practically, the only figures he gives are those from treatment with albucid [sulphacetamide], prontosil and eubasin [sulphapyridine]. Albucid has a twofold action—on the virus and on the trachomatous tissue. " Forty-eight per cent. of patients followed up could be regarded as cured " [but this seems to refer to 23 cases only, reported by LORENZ]. Of 145 cases of different stages of trachoma treated by GLOWATZKY, half were given eubasin and half albucid ; 93 per cent. were clinically cured. Sulphonamides left a residue with scars (nebulae) and in this respect albucid presented " a certain superiority " over eubasin [but no comparative figures are given].

The author concludes : Most observers look upon sulphonamide treatment of trachoma as a definite advance ; it has raised the percentage of cures and cuts short the time needed for cure. Albucid has proved to be the best, but eleudron [sulphathiazole], eubasin, cibazol [sulphathiazole] and other sulphonamides also proved serviceable [in the absence of details such a general statement does not convey much useful information]. Local treatment by ointment and subconjunctival injections are not of much benefit unless combined with internal administration—three tablets, each of 0·5 gm., three times on the first day, twice on the second and third days, repeated, if necessary, after an interval of 3–4 days. Its beneficial action is shown by rapid retrogression of the inflammation, reduction of secretion, and healing of the corneal complications.

Good reports have been made, says the author [in these general terms only] on the benefits of sulphonamide drugs in acute purulent affections of the lids and tear ducts, in corneal ulcers, especially ulcus serpens, and in gonococcal infections of the newborn. As drawbacks to the use of these drugs, transient myopia has been not infrequently observed, with spasm of accommodation, some swelling of the lens and slight rise of intraocular pressure. Spasm of the ciliary muscles does not alone explain the myopia ; it is due in part to the changes in the lens. *H. Harold Scott.*

HEYDEN, G. Erfolge der Trachomtherapie. [**Results of Treatment of Trachoma.**] *Deut. Militärarzt.* 1944, Mar., v. 9, No. 3, 135–7.

We must not be surprised at reading in a German paper that trachoma prevails in 96 per cent. of British India, in 80–90 per cent. of Egypt, in 30–80 per cent. of Russia, in 20 per cent. of Japan and in only 1–4 per cent. of Middle and Western European States, and that the basic cause is bad conditions of hygiene. The lines of treatment are early eradication by application of silver nitrate or copper sulphate and, later, plastic operation. The author proceeds to remark on newer methods, mentioning the local use of chaulmoogra oil to the lids every two or three days, which, he says, gives poor results ; repeated application to the conjunctiva of dilute cyanide of mercury [the degree of dilution is not stated], the local use of X-rays (which causes considerable pain and, moreover, is usually ineffectual). Sulphonamide drugs, as subconjunctival injections of 0·2 cc. of 5 per cent. prontosil [how often the author does not say] together with its administration *per os* [dose not stated] brought about cure of 16 out of 53 cases in one month, in another 16 in two months, 7 in three months, 4 in four months, and 2 in six months. [A report based on only 53 cases is not very convincing.] *H. Harold Scott.*

FILATOV, V. P. **Tissue Therapy in Ophthalmology.** *Amer. Rev. Soviet Med.* 1944, Oct., v. 2, No. 1, 53–66, 46 figs. (44 on 4 pls.).

The author maintains that when animal and plant tissues are isolated and stored under certain conditions, substances accumulate in them which stimulate metabolic processes. These substances have been named " biogenic stimulators." Their chemical nature is unknown. When tissues rich in " biogenic stimulators " are introduced into a diseased organism by transplantation or by injection of extracts, the regenerative powers of the treated organism are increased and the pathological processes are suppressed.

Tissue, usually skin or cornea, may be removed aseptically within 10 hours of death from the cadavers of persons who have died of non-infectious diseases or from trauma, and be transferred to a sterile bottle and stored at 2–4°C. for seven days. Spirochaetal infection, if present, totally disappears in this time. Autoplastic material (usually skin) may be obtained from the living subject

and stored in the same way, while homoplastic material (skin or placenta) may also be employed. Placenta is usually made use of in the form of a sterile aqueous extract. Animal material, such as skin, testis, etc., from rabbits, sheep and calves, the aqueous humour from cattle eyes, and spinal fluid, has also been used. " Biogenic stimulators " are reported to be present in cod liver oil and aloe leaves.

For administration, skin, preserved by refrigeration, is implanted subcutaneously and kept in place by interrupted sutures. Healthy granulation tissue forms at the site of the transplant. Therapeutic grafting of preserved cornea is carried out like a partial lamellar transplantation. Placenta and other tissues which have been refrigerated for seven days may be implanted into pockets made by incising into the subcutaneous tissue or into the subconjunctival tissue. Fluids (aqueous humour, blood, spinal fluid or aqueous extracts of preserved tissues or aloe leaves) are injected subcutaneously or subconjunctivally.

This treatment has been used successfully in cases of lupus vulgaris, tuberculous ulcers, lupus erythematosus, gummata, and cutaneous leishmaniasis, etc., but the author gives greatest attention to ophthalmological conditions. He has used this method of therapy in interstitial keratitis, in tuberculosis of the cornea (with successful results in 21 out of 25 cases), in keratitis rosacea (five cases), in trachomatous pannus (300 cases), in uveitis, in retinitis pigmentosa (112 cases), in myopic chorioretinitis (250 cases), in atrophy of the optic nerve (over 100 cases), and in glaucoma (60 cases).

The results are reported to have been very satisfactory, particularly in optic atrophy, retinitis pigmentosa, and keratoconus. *J. N. Davidson.*

HEAT STROKE AND ALLIED CONDITIONS.

SHEPHERD, H. M. D. **Effects of Heat in Iraq.** *J. Roy. Army Med. Corps.* 1945, Jan., v. 84, No. 1, 1–8.

A description is given of cases of effects of heat seen during three summers in the plains of Iraq. The cases are divided into four types :—

(i) *Acute heat-stroke.*—This conformed to the usual description. The chief features were loss of consciousness, and a rectal temperature of more than 106°F. No specific mention is made of inability to sweat.

(ii) *Heat exhaustion.*—These patients were dehydrated, often with a low blood-pressure or pulse-pressure. The urinary chlorides were reduced or absent. The cause was therefore considered to be salt-deficiency.

(iii) *Subacute effects of heat.*—These patients had a moderate pyrexia—up to 103 or 104°F.—which might continue for as long as two weeks, with vomiting, muscular twitchings, convulsions, or mental changes, varying from slight disorientation to violent mania. The first sign of trouble was often the occurrence of a fit, or a change in behaviour. Some patients of this type were first admitted as mental cases.

(iv) *Heat pyrexia, or short fever.*—These patients had a temperature for a few days, and then recovered without indication of the cause. The author argues that the cause was heat : the cases showed none of the features of malaria, dengue, or sandfly fever. The incidence depended on the weather : more patients were admitted on the hot windless days than on the less hot days.

Diagnosis and treatment of all cases are discussed on standard lines. In connexion with prognosis, some points of great practical importance are brought out, which may be given in full :—

(1) Mental changes, whatever the temperature, constitute a most dangerous sign and demand vigorous treatment.

(2) Vomiting is a dangerous sign except in patients who are beginning to recover from heat-stroke ; in these, provided it lasts only a short time, it is a sign of improvement.

(3) A patient with heat-stroke should never be regarded as past hope until he is dead. There is no other condition in which a patient can look so ill and yet recover.

(4) It may be more dangerous for a man to have severe subacute effects of heat than it is for him to have heat-stroke. The reason for this is that heat-stroke is an obvious emergency and receives vigorous treatment, whereas subacute effects of heat may not. Also, the subacute case in the later stages is more resistant to treatment than acute heat-stroke.

[The classification of types of effects of heat that is given here is in close agreement with that proposed by other recent workers (see LADELL *et al.*, this *Bulletin*, 1945, v. 42, 143). In spite of much that has been published on heat effects, the nature and cause of the "subacute" type remains singularly obscure. The reviewer, working in Southern Iraq in 1943, did not see a single patient of the "subacute" type among some 200 cases of effects of heat that occurred in the area. Cases had, however, been fairly numerous in 1942, which was hotter than 1943. It is not clear whether these patients were dehydrated and salt deficient ; whether there was any disturbance of sweating ; nor even whether they represented a distinct type of effects of heat, or whether they developed from some other type through lack of adequate treatment. There is little in the literature to add to what Major Shepherd has said.

The symptomatology is protean, and the prognosis bad. For this first reason, more information is urgently needed. This should include :—

(i) condition of the skin, with regard to sweating, scaling, and prickly heat ;
(ii) presence or absence of signs of dehydration ;
(iii) blood-pressure, both lying down and standing up ;
(iv) urinary volume, specific gravity, and chloride content ;
(v) plasma chloride and blood urea values. *J. Waterlow.*

MARSH, F. **Animal Life in Deserts.** [Correspondence.] *Lancet.* 1945, Mar. 3, 289.

The writer of this letter, whose work on heat stroke is well known, refers to the paper by LADELL, WATERLOW and HUDSON [this *Bulletin*, 1945, v. 42, 143]. He states that loss of body weight in hot weather is not a feature of well acclimatized persons ; they may, in fact, show increase in weight, by developing "an oedematous 'hump' to keep them going between drinks of water."

A striking feature of heat exhaustion is the stuporose mental reaction, which, however, clears up after two or three days' rest in bed. A cool room is essential for effective treatment. Marsh states that the natural inclinations are no guide to the amount of water needed in these desert conditions ; it is necessary for a man to drink 12–30 pints of water a day, with equivalent amounts of salt, but he may not actually feel the need for such quantities. Moreover, these large amounts may lead to acute dyspepsia, but there is no other route for water absorption.

Anoxia has been associated with therapeutic hyperthermia, and Marsh has given oxygen, with success, in cases of heat exhaustion. He remarks on the need for careful selection of men for service in the tropics, and on the importance

of careful acclimatization before exposure to the most severe heat. Air conditioning of quarters and hospitals is needed. An attack of sandfly fever, or other fever, or even temporary dehydration, may stop sweating by some central action on the hypothalamus. *Charles Wilcocks.*

BLACK, D. A. K. **Dehydration.** *Lancet.* 1945, Mar. 10, 298–300. [10 refs.].

After a brief discussion of the normal intake, output and distribution of water in man, two different types of dehydration are considered; the one is due to water deprivation, the other secondary to salt deficiency.

Water Deficiency :—Experimental subjects on a dry diet can go without water for three or four days [but only in temperate climates] without becoming really ill. After an initial rapid drop the weight falls slowly; blood urea rises; plasma sodium and chloride also rise, but there is no haemoconcentration as about two-thirds of the water lost is intracellular in origin. The urine volume is low (about 500 cc. per day) but this is not due to renal failure; the urine has a high specific gravity (above 1030) and is concentrated. Diureses in response to salt or to urea are obtainable [some workers believe that a urine volume of 500 cc. or more per day is due to excessive protein katabolism; when protein intake and breakdown have been cut to a minimum, much lower urine volumes have been obtained during water deprivation].

Salt Deficiency :—In contrast to water deprivation, salt deficiency is associated with marked apathy and exhaustion, and with painful cramps. Nearly all the fluid lost is extracellular, and there is a fall in plasma sodium and chloride. The extracellular fluid loss is shown by haemoconcentration, and it results in circulatory failure. The urine volumes are not so low as in water deprivation, and the urine is more dilute.

In practice, dehydration is usually mixed; the treatment required depends on the factor predominating, which may be diagnosed from the subject's history and clinical condition and from laboratory investigations. If the fluid loss has been mainly from the skin and lungs, water deprivation predominates; if the dehydration is due to vomiting or diarrhoea, there is considerable salt loss. Clinically, circulatory failure and muscle cramps are indications of severe salt deficiency. Laboratory investigations should include examination of the urine for chloride, of the blood for haemoconcentration and, if possible, estimation should be made of plasma chloride and sodium. For water deficiency, water or 5 per cent. glucose should be given; for salt deficiency "normal saline", and in mixed cases varying proportions of "half normal" (0·45 per cent.) and "normal saline," as the condition of the patient indicates. Hypertonic saline is only rarely required. It is important that the water and salt requirements of the patient should be reassessed daily, the various investigations being repeated as often as possible. *W. S. S. Ladell.*

TROPICAL ULCER.

MINA, H. **Sulphonamides and Tropical Ulcers.** [Memoranda.] *Brit. Med. J.* 1945, Mar. 17, 369.

The author has treated tropical ulcers successfully as follows:—"Paint the ulcer with 2½ per cent. tincture of iodine, especial care being taken to see that it reaches well under the enveloping edges. Allow it to dry, then cover it with a layer of powder made up of equal parts of sulphanilamide and magnesium sulphate. Repeat treatment daily until cured."

Notes of three cases are given : an old much-treated ulcer, 2 inches wide and half an inch deep, in a girl aged 11 years, healed in eight days ; an ulcer 4 inches long, 2 inches wide, and 1 inch deep, in a woman aged 40, healed in two weeks ; a sloughing and gangrenous area on the forearm, 4 inches long, which had developed after a comminuted fracture, healed in two months.

No bad effects of the drug have been observed. The author states emphatically that aqueous antiseptic solutions should never be used to treat tropical ulcers.

J. F. Corson.

HAMM, W. G. & OUARY, G. **Penicillin Therapy in Phagedenic Ulcer (Tropical Sloughing Phagedena). Report of Eighteen Cases.** *U.S. Nav. Med. Bull.* 1944, Nov., v. 43, No. 5, 981–7.

Penicillin was used as a local dressing in 18 cases of tropical ulcer ; at first intramuscular injections were tried but the patients, who were all " natives " [race or country not mentioned], objected strongly and it was abandoned though good effects were observed.

The ulcer was cleaned and gauze, soaked in a saline solution of penicillin containing 2,500 units per cc., was applied. Although dressings could be changed once a day only, owing to the limited supply of penicillin, and although the patients persisted in walking as soon as the pain had ceased, strikingly good results were obtained. The treatment was continued for 2 or 3 days after the ulcer had become clinically clean and the fusiform bacilli and spirilla had disappeared ; wet saline dressings were then used. The penicillin dressings caused no pain and no irritation of the skin nor did they unfavourably affect subsequent skin grafting. Notes of the 18 cases are given and show excellent results, complete healing having taken place in 3 or 4 weeks in most of the cases, some without skin grafts.

The authors conclude that " it is perhaps the most efficacious of all forms of therapy that have been used in the treatment of phagedenic ulcer."

J. F. Corson.

MISCELLANEOUS DISEASES

FETTERMAN, G. H., MORAN, T. J. & HESS, W. R. **The Cold Agglutination Test : I. Studies on Naval Hospital Patients. II. Studies on Natives in Yaws-Endemic Area.** *U.S. Nav. Med. Bull.* 1944, Dec., v. 43, No. 6, 1128–36. [Summary appears also in *Bulletin of Hygiene.*]

Cold agglutinins in high titre have been observed to occur regularly only in the following diseases : primary atypical pneumonia of unknown aetiology [*Bulletin of Hygiene*, 1943, v. 18, 618 & 897] ; African trypanosomiasis (KANTHACK, DURHAM and BLANDFORD, *Proc. Roy. Soc.*, 1898, v. 64,100 ; *Sleeping Sickness Bulletin*, 1908, v. 1, 60, ; 1910, v. 2, 331 and 400, 1911, v. 3, 53) ; paroxysmal haemoglobinuria (STATS and WASSERMAN, *Medicine*, 1943, v. 22, 363) ; and mumps (TURNER, NISNEWITZ, JACKSON and BERNEY, *Lancet*, 1943, June 19, 765). DAMESHEK [*Bulletin of Hygiene*, 1944, v. 19, 180] reported their occurrence in haemolytic anaemia after sulphonamide therapy. Cold agglutination [autoagglutination] has also been observed to occur, irregularly, in many other conditions (STATS and WASSERMAN, *loc. cit.*).

The authors carried out tests on human blood sera at a Naval hospital laboratory in a South Pacific island ; the patients included many members of the Naval personnel suffering from various diseases, and also some natives in the island. They used the technique of HORSTMANN and TATLOCK [*Bulletin of Hygiene*,

1943, v. 18, 897] the readings being made with the naked eye. The diseases of the Naval hospital patients included lobar and broncho-pneumonia, bronchitis, bronchial asthma and related conditions, clinical pulmonary tuberculosis, many contagious and infectious diseases, in particular malaria, syphilis and mumps with orchitis. Some healthy controls were also examined.

Among the respiratory diseases, primary atypical pneumonia alone showed titres higher than 1 : 16, and among the 158 patients with other diseases—which included malaria, dengue, filariasis, infective jaundice, syphilis, gonorrhoea (treated with sulphonamide), mumps and several other diseases, only one, a case of mumps with orchitis (titre 1 : 32), had a titre above 1 : 16. In some cases significant titres were found during the first week of the disease [see HEINTZELMAN & SELIGMAN, *Bulletin of Hygiene*, 1945, v. 20, 244]. The 14 healthy controls gave negative results, except one who had a titre of 1 : 8.

The examination of the sera of natives of a yaws-endemic area gave interesting results ; they are shown in the following Table :—

TABLE 3.—*Cold agglutinins in native groups.*

Race and condition	Number of individuals	Cold agglutinins	
		1 : 16 or less	1 : 32 or less
Melanesians	86	38—(24)	48—(32)
Lepers	52	19—(10)	33—(18)
Non-lepers	34	19—(14)	15—(14)
Malaysians and Caucasians ...	35	30—(2)	5—(2)
Lepers	20	17—(1)	3—(2)
Non-lepers	15	13—(1)	2—(0)

Note.—Figures in parentheses indicate number of individuals having positive Kahn reactions.

The authors concluded that leprosy was not the underlying factor ; the healthy non-leprous Melanesians had more high titres than the non-leprous Malaysians and Caucasians, but they also had more positive Kahn reactions, probably due to yaws, which is endemic. The positive Kahn results, however, were about evenly distributed among persons with high and low cold agglutinin titres, and none of the Kahn-positive cases of syphilis among Service personnel had a high titre in the cold agglutinin test. The authors think that yaws may be a factor, though they mention the possibility that there may be some unrecognized factor or disease. A further study of yaws could not be made.

They concluded that a titre of 1 : 32 or over, in Service personnel, was strong evidence for the diagnosis of atypical pneumonia. *J. F. Corson.*

HERTEL, H. W. Über " russisches Kopfschmerzfieber " im Westen. [**"Russian Headache Fever " in the West.**] *Deut. med. Woch.* 1944, July 7, v. 70, No. 27/28, 390–91.

The author regards three cases of short fever seen by him in western Europe as belonging to the same type as the " Russian headache fever " described by SCHULTEN and BROGLIE [see this *Bulletin*, 1944, v. 41, 127] and the fever described by SYLLA [*ibid.*, 128].

There were some points of clinical difference, but these are regarded as falling within the limits of variability of a fever of this kind.

The three cases occurred quite independently of each other ; the onset in the case that is fully described was on December 22nd, 1943. [In the two fevers mentioned above the cases occurred in August, September and October, and the disease disappeared in the cold season.]

The author states that lice and other " parasites " could be excluded as transmitting vectors and that there was no indication to show the mode of transmission. He regards the disease as a meningoencephalitis, probably caused by a virus. No bacteriological or serological investigation was considered necessary because the clinical features did not suggest typhoid or typhus fever.

[No reference is made to the possibility that the disease might have been caused by a strain of influenza virus. The clinical description seems to be compatible with this hypothesis.] *John W. D. Megaw.*

KNOTT, J. I. **" Filarial " Abscesses.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Dec., v. 38, No. 3, 235.

The author treated intramuscular abscesses in natives of the Cook Islands by aspiration, using an intravenous transfusion needle. Early abscesses were usually cured even if only 1 cc. of pus was withdrawn ; large abscesses required two or more daily aspirations. In many cases a patient who was carried to the hospital could walk home after the aspiration. Smears of the pus showed leucocytes packed with staphylococci. Although most of the people had filariasis, no connexion between this and the abscesses was found. Treatment of intramuscular abscesses with sulphonamides was ineffective. *J. F. Corson.*

CLEARKIN, P. A. **Tropical Eosinophilia or Loeffler's Syndrome.** *Caribbean Med. J.* 1944, v. 6, No. 5, 252–6.

A report of a case in British Guiana.

ANDERSON, T. F., BEGG, F. H. H., & MCNAUGHTON, F. **Poisoning with Datura.** *East African Med. J.* 1944, Dec., v. 21, No. 12, 355–61, 1 fig.

During a period of 10 months, October 1943 to August 1944, cases of food-poisoning totalling 1,524 occurred among recruits and African troops in Uganda. There were no fatalities among them and no Europeans reported sick from this cause. All those attacked had been supplied with flour issued from two cook-houses. The chief symptom (in some the only symptom) was dryness of the mouth and throat ; others suffered from visual hallucinations, loss of memory, mental excitation even to mania ; mydriasis was not common. The attacks were on the whole mild and recovery took place within 24 hours.

Some toxic component of the flour was suspected ; first *Lolium temulentum* [which, however, is usually associated with vertigo, staggering gait, tremors, burning sensations in the throat and prostration], then Cassava, as the Bitter Cassava contains a cyanogenetic principle, but the actual cause was found to be admixture of the seeds of Datura. The fact that only Africans, no Europeans, were affected is explained by the wheat intended for flour being cleaned and any contaminating Datura removed by the millers prior to grinding, whereas wheatmeal supplied to the Africans is ground by small millers who either do not know, or have no facilities for separating, the adulterating Datura seeds. [See also this *Bulletin*, 1938, v. 35, 837, for a similar occurrence in Tanganyika Territory in 1938.] [The seeds of Datura closely resemble mustard seed and are [or used to be] commonly added to the latter by thieves in India and mixed with the food of their intended victims to stupefy them while they robbed them. The victims on recovery usually retained no consciousness of their attack.] *H. Harold Scott.*

RAYMOND, W. D. **A Short Note on Human Datura Poisoning in Tanganyika.** *East African Med. J.* 1944, Dec., v. 21, No. 12, 362–4.

Dr. Raymond contributes an interesting note on Datura and poisoning by its seeds. The fruit, he states, also contains the toxic alkaloids, hyoscine, hyoscyamine and atropine, especially the first, but only about one-fifth the amount present in the seeds. These seeds may be present accidentally in meal, as in the outbreak reported above, and Raymond mentions the case of a European under his own observation who was poisoned by Datura-contaminated meal. The secret drug known as Lukuma, added to native food (pombe) by would-be robbers, is Datura. It is administered for producing insensibility, to facilitate theft and not for homicidal purposes, but those who employ it do not always stop to measure dosage and fatal cases sometimes occur. In meal the contamination is accidental and consequently unevenly spread, and the author shows that some samples contained 0·02 mgm. per 100 gm., others more than eight times this amount. Prolonged cooking in water destroys fully half the toxic alkaloids.

H. Harold Scott.

WRIGHT, F. J. **A Note on Poisoning by** *Datura stramonium* **in Civilian Practice.** *East African Med. J.* 1944, Dec., v. 21, No. 12, 365–7.

The author has seen nine cases of Datura poisoning in the last three years; three of the patients were Indians who may have taken the seeds purposely. As the patient may be comatose when first seen, the diagnosis is not easy and other causes of coma must be excluded, meningitis, cerebral malaria, cerebral haemorrhage, diabetes, etc., but if these are excluded and if the stomach contents can be examined the seeds or fragments of them will be found. Apomorphine in most cases (if the coma is not very deep) will result in vomiting, but if there is deep coma the vomiting centre is depressed and cannot be stimulated.

The Editor of the *East African Medical Journal* adds an interesting footnote telling how children may be poisoned by "sucking the honey out of the nectaries at the base of Datura flowers," and chickens by being given Kenya chickwheat heavily contaminated with the seeds. He remarks also on the varying susceptibility of different animals to Datura; rabbits are almost insusceptible and can eat 100 gm. a day without showing any symptoms; cats are also tolerant but less so than rabbits, while cattle and horses are less tolerant than are sheep.

H. Harold Scott.

MARIANI-TOSATTI, G. Avvelenamento da Datura Stramonium (Quattro casi). [**Four Cases of Poisoning by** *Datura stramonium.*] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1944, v. 4, No. 2, 295–303. English summary (3 lines).

All four patients were children: a girl aged 10, and three boys aged 3, 5 and 8 years, observed by the author in Asmara. They had wandered unsupervised in a garden and all presented a similar train of symptoms—flushed face, dilated pupils, dry throat, laughing and crying and giving signs of hallucinations; the oldest child had a staggering gait and kept falling into brief snatches of sleep and then waking and calling for something to drink. All the children recovered. The rest of the paper is taken up with general remarks on Datura.

H. Harold Scott.

GENERAL ENTOMOLOGY.

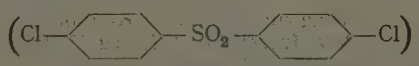
DAVID, W. A. L. **Insecticidal Sprays and Flying Insects.** [Correspondence.] *Nature.* 1945, Feb. 17, 204, 3 figs.

Insecticidal mists have very little action on flies or mosquitoes at rest. In order to be effective the droplets of spray must impact upon the insect. This may perhaps result from the movement of the droplets imparted by the spray gun, but the active movements of the insect during flight are much more important in bringing about impaction. Experiments with *Aëdes* and *Musca* here described prove that by far the greatest number of droplets impact upon the wings. The wings are then cleaned with the legs and in this process the insecticide is brought into contact with the feet, which are known to be one of the most permeable regions. In *Musca* much of the insecticide may be removed from the fore-feet by the proboscis, and swallowed, and may thus perhaps act as a stomach poison. If the wings are removed just after exposure to an oil spray mist, the kill may be reduced by about 50 per cent. in comparison with a group with wings intact. Clearly, a substance such as pyrethrum, which excites the insects to flight, is a desirable constituent in fly and mosquito sprays.

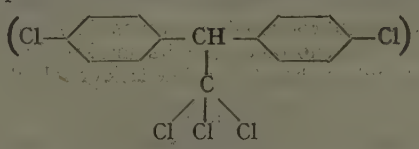
V. B. Wigglesworth.

LÄNGER, P., MARTIN, H. & MULLER, P. Ueber Konstitution und toxische Wirkung von natürlichen und neuen synthetischen insektentötenden Stoffen. [**Constitution and Toxicity of Natural and of New Synthetic Insecticides.**] Reprinted from *Helvetica Chimica Acta.* 1944, v. 27, No. 4, 892–928, 12 figs. (10 on 4 pls.). [Summary appears also in *Bulletin of Hygiene.*]

In this interesting lecture some account is given of the search for new insecticides carried on by the Swiss firm of J. R. Geigy A.G. in Basel over a period of more than 10 years, which culminated in the discovery of the insecticidal properties of 4, 4′-Dichlordiphenyltrichlormethylmethane, generally known as DDT. The original purpose was to find a stomach poison for clothes moths, with which textiles could be impregnated. One of the most promising materials proved to be 4,4′-Dichlordiphenylsulphone

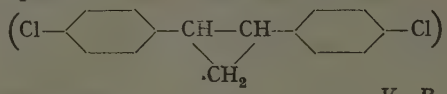


There was in fact much evidence that *pp′* halogenated compounds of this general type were highly insecticidal and it appears to have been a deliberate search among other compounds of that structure which led to the testing of DDT



DDT is a nerve poison which is toxic to insects in exceedingly minute doses. It is lipoid-soluble and it is to this property that the authors attribute its efficiency as a contact insecticide, its entry into the insect cuticle being favoured by the lipoid material in the epicuticle. They conclude that the specific toxic properties reside in the two linked benzene rings chlorinated in the *pp′* position; the lipoid solubility being conferred by the chloroform residue which links the two benzene rings together. There is evidence that the more

the substance used in the place of the chloroform is lipoid-soluble, the more toxic is the compound, the most effective being that derived from another narcotic, cyclopropane



V. B. Wigglesworth.

MOOSER, H. Die Bedeutung des Neocid Geigy für die Verhütung und Bekämpfung der durch Insekten übertragenen Krankheiten. [**The Importance of "Neocid" (Geigy) for the Prevention and Control of Insect-borne Diseases.**] *Schweiz. med. Woch.* 1944, Sept. 9, v. 74, No. 36, 947.

This paper gives a brief summary of the facts recorded in full by LÄNGER, MARTIN and MÜLLER [above], and then surveys the applications of DDT in human hygiene ["Neocid" is the insect powder containing 5 per cent. of DDT, patented by the Geigy firm for use against insects affecting man]. The powder has been highly successful for delousing. It is, however, somewhat slow in action, 12–48 hours being required before all lice are killed. A lasting action on clothing can be obtained by impregnating with a 0·2 per cent. aqueous emulsion of "Neocid TX". If not washed, such clothing remains active in killing lice for 1–3 months. Heavy impregnations of clothing remain effective after washing; but the method of washing greatly influences the degree of persistence and the author recommends a reimpregnation after each wash. Head lice are likewise killed by the emulsion, but after treatment of the head with a 0·1 per cent. emulsion there is almost no insecticidal action persisting beyond 36 hours.

DDT applied to surfaces of walls etc. is highly toxic to flies which settle thereon. It is equally toxic to *Anopheles* and *Culex* mosquitoes and ROSE [among many other workers] has claimed that its application in this way will go far to control malaria in rural areas. Fleas are very susceptible to DDT and their larvae even more so. It is very useful for controlling fleas in animal houses and may prove invaluable in combating bubonic plague. Treatment of dwellings with Neocid dust will keep them free from bed-bugs for months.

V. B. Wigglesworth.

DOMENJOZ, R. Experimentelle Erfahrungen mit einem neuen Insektizid (Neocid-Geigy), ein Beitrag zur Theorie der Kontaktgiftwirkung. [**Experimental Studies on a New Insecticide, "Neocid" (Geigy), a Contribution to the Theory of the Action of Contact Poisons.**] *Schweiz. med. Woch.* 1944, Sept. 9, v. 74, No. 36, 952; 1 chart. [10 refs.]

The author uses the name GNB (Gesarol-Neocid-Basis) for the active principle in the insecticidal preparations "Gesarol" and "Neocid" produced by J. G. Geigy, A.G., Basel, and commonly known as DDT. The most important general properties of this substance are its marked lipoid solubility; its insolubility in water; and its almost complete lack of volatility.

Its action on the human louse has been studied in detail. Fabrics impregnated with solutions containing as little as 0·00001 per cent. DDT are still slowly toxic to lice. Even higher concentrations (0·01 per cent.) require a period of 24–30 hours to kill all the lice; but contact with the material for only one hour leads to a very high subsequent mortality. The affected insects first become excessively active and later incoordinated, with tremors; once these symptoms appear, they never recover.

In mammals DDT also acts as a nerve poison. It causes no local irritation when applied to the skin or conjunctiva of man or animals. When given by mouth to animals as an emulsion in gum arabic the L.D.50 in gm./kilo. was:

mouse, 1·6 ; rat, 0·5 ; guineapig, 2·0 ; rabbit 0·275. Administered in olive oil it was far more toxic : mouse, 0·175 ; rat, 0·28. The poisoned animals showed hypersensitivity, tremors, and in the later stages epileptiform spasms with opisthotonus. There was no sign of any cumulative action : mice and rats receiving 50 mgm. per kilo. of food material for 70 days showed no ill effects. Applied to the skin as an emulsion in gum arabic, the L.D.50 for the rat is given as about 1,000 gm./kilo. ; but it is much more toxic when dissolved in olive oil : mouse and rat : 0·25–0·5 gm./kilo. It is concluded that the 5 per cent. preparations as marketed are practically non-toxic to mammals.

The remarkable toxicity of DDT to insects is attributed on the one hand to the lipoids in the cuticle, which favour its entry through the integument, and on the other to the existence in insects of a peripheral nervous system containing ganglion cells, which lies immediately below the cuticle and is responsible for regulating muscle tonus. *V. B. Wigglesworth.*

MANDEKOS, A. Toxische Wirkung von Neocid auf Larven, Puppen und Imagines von Anopheles und Culex. [**Toxicity of Neocid to Larvae, Pupae and Adults of** *Anopheles* **and** *Culex*.] *Deut. Tropenmed. Ztschr.* 1944, Feb.–Mar., v. 48, No. 3–6, 84–8.

Because of the shortage of Paris Green, which is not in any case completely satisfactory for the control of *Anopheles superpictus* in running water, experiments were carried out with Neocid and with calcium arsenite. Neocid is a proprietary product containing 5 per cent. 2,2,bis (para-chlor phenyl) 1,1,1 trichlorethane (DDT).

The experiments were carried out during June–September 1943, when the prevailing temperature was usually between 28° and 30°C. Neocid was shown to kill culicines and anopheline adults in 3½ hours while the first symptoms of tremors and paralysis were apparent in 15 minutes. Larvae were killed in 3½–5 hours, but pupae survived for 29 hours. The effect on the eggs of *A. superpictus* is uncertain.

Suspensions of 0·1 to 1·0 per cent. Neocid in water killed all stages of anopheline and culicine larvae in 3–10 hours according to the concentration used. In natural breeding places, where conditions were such that Paris green and calcium arsenate gave unsatisfactory results, Neocid applied as a 0·35 per cent. suspension in water to give 0·035 gm. of the pure substance per square metre left only about 0·2 per cent. of the larvae alive.

The action of Neocid on adult mosquitoes was clearly shown by experiments in cowsheds where the application of Neocid in water suspension at the rate of 1 gm. per square metre (*i.e.* 0·05 gm. pure DDT) gave complete kills of anophelines for a month. Little or no advantage resulted from adding a small quantity of oil to the spray.

When natural breeding places are being sprayed with Neocid water suspensions, the effectiveness of the treatment is increased by the presence of oil in the mixture. Under these circumstances the presence of oil is advantageous since it serves to distribute the Neocid much further over the water surface than occurs with plain water suspensions. Neocid at 0·15 gm. per square metre applied as a 0·2 per cent. suspension was satisfactory in standing water but with stronger currents the concentration must be increased to 0·4–0·55 per cent. and the deposit to 0·8 gm. per square metre.

It is pointed out that ingestion or penetration of Neocid into the respiratory system of the larva is not a necessary preliminary to effective action as it is in the case of other larvicides. [It seems possible, however, that the greater resistance of the pupae could be accounted for by the fact that they do not feed and so avoid ingesting the poison.]

Calcium arsenate at 3–5 per cent. in road dust was about equally efficient as 1 per cent. Paris green in a similar medium and might be used to replace the latter as a practical larvicide. *W. A. L. David.*

MÜLHENS, K. Ueber bisher nicht bekannte insektizide Eigenschaften der Baumwolfsmilch (*Euphorbia dendroides* L.) [**A New Insecticide from** *Euphorbia dendroides.*] *Deut. Tropenmed. Ztschr.* 1944, Feb.–Mar., v. 48, No. 3/6, 79–84.

The insecticidal properties of *Euphorbia dendroides* were examined because it was reported to be used as a fish poison in Crete.

The plant is found growing in dry, sheltered, stony places on Crete and the Greek mainland. It remains green despite the low rainfall and is eaten by animals. It reaches commonly 50 cm. in height and 80 cm. in circumference, with a total fresh weight between 500–2,000 gm. The toxic action was confirmed on *Gambusia.*

It was found that a drop of the milky sap placed on the back of ants and bugs killed the insects in a few minutes. A 1 : 100 dilution of the sap also killed bugs. Separate aqueous extracts were prepared of the stems, leaves and roots. The stems appeared to give a slightly less effective product but with extracts equivalent to 1·0 gm. of dry plant per 100 cc. of water, kills of bugs amounting to 80–100 per cent. were obtained within a few minutes. An extract containing 2·5 gm. of dried leaf per 100 cc. stupefied *Musca domestica,* but the insects recovered. When 1 cc. of a 5 gm./100 cc. leaf extract was atomized into a 500 cc. flask, the exposed house flies were invariably killed. *Culex* spp. and *Phlebotomus* spp. were killed by more dilute solutions. Experiments with dust showed that 0·5 gm. powdered leaf in a 500 cc. flask killed houseflies within 4·6 hours and *Phlebotomus* spp. in a much shorter period. Corresponding exposures were not effective against bugs.

Effective sprays were also obtained when the leaves were extracted with acetone and the resulting solution diluted with water. Solutions containing the equivalent of about 1·0 per cent. dry leaf powder were completely effective against house flies and bugs under the testing condition employed. The following formula is recommended for practical use. Extract 50 gm. of leaves for three days with 1 litre of water at 55°C., and to this add 0·5 litre of a 1 per cent. aqueous soap solution.

It appears that the extracts prepared from fresh and dried material are almost non-toxic to warm blooded animals. *W. A. L. David.*

DOVE, W. E. **Insect Repellents.** *Soap.* New York. 1945, Jan., v. 21, No. 1, 121 & 121B.

This article gives a semi-popular account of the large amount of work that has been done in America in the search for synthetic repellents which will not be injurious when applied to the human skin. More than 4,000 compounds have been tested. Three have proved satisfactory from the standpoint of repellency (they will give complete protection in cage experiments [*i.e.* no single bite is received] for 120 minutes against *Anopheles quadrimaculatus* and 180 minutes against *Aëdes aegypti*), and from the standpoint of toxicity. These are dimethyl phthalate, " Indalone " [*n*-butyl mesityl oxide oxalate] and " Rutgers 612 " [2-ethylhexane diol-1, 3]). Since these substances vary in effectiveness against different biting insects it has been found advantageous to mix them in the proportion of 6,2,2. This is helpful also from the point of view of supply. This mixture is much more effective than the essential oils which have been in use in the past. *V. B. Wigglesworth.*

HOLDEN, J. R. & FINDLAY, G. M. **Pyrethrum as a Tsetse Fly Repellent: Human Experiments.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Dec., v. 38, No. 3, 199–204.

"Anti-mosquito cream Mark II," a vanishing-cream containing an unspecified quantity of pyrethrum, was found to provide protection to man against the bites of *Glossina palpalis* up to at least six hours after application, provided excessive sweating did not occur. The same cream also gives a considerable degree of protection against the bites of *Culicoides* sp. *V. B. Wigglesworth.*

i. FARNER, D. S. & BOHART, R. M. **A Preliminary Revision of the *scutellaris* Group of the Genus Aëdes.** *U.S. Nav. Med. Bull.* 1945, Jan., v. 44, No. 1, 37–53, 4 figs & 1 map. [30 refs.]

ii. ——. **A New Species of Aëdes from the Caroline Islands.** *Proc. Biol. Soc. Washington.* 1945, v. 58, 59–62.

i. In this paper certain forms, previously regarded as varieties or sub-species of the mosquito *Aëdes* (*Stegomyia*) *scutellaris* (Walker), often called *variegatus* (Doleschall) in the literature, are raised to specific rank and considered with other recently described closely related species. Geographical distributions are given, with a useful tabular statement for making identifications. Adult mosquitoes alone are considered.

Aëdes (*Stegomyia*) *pseudoscutellaris* (Theobald) (=*variegatus* var. *pseudoscutellaris* (Theobald) of Edwards, 1926 and others, = *scutellaris* var. *pseudoscutellaris* (Theobald) of Edwards, 1932 and others) from Fiji; Samoa; Wallis; Ellice Islands; Cook Islands; Society Islands; Tuamotu; Marquesas Islands.

Aëdes (*Stegomyia*) *tongae* Edwards (=*variegatus* var. *tongae* Edwards, 1926 and others, =*scutellaris* var. *tongae* Edwards, 1932 and others) from Tonga Islands; Sikiana, Solomon Islands (probably an introduction to the latter; see BUXTON and HOPKINS, 1925, *London School Hyg. & Trop. Med., Mem. Ser.*, no. 2 : 103).

Aëdes (*Stegomyia*) *horrescens* Edwards (=*scutellaris* var. *horrescens* Edwards, 1935) from Taveuni, Fiji.

Aëdes (*Stegomyia*) *pernotatus* Farner and Bohart, from Espiritu Santo and Efate, New Hebrides.

Aëdes (*Stegomyia*) *hebrideus* Edwards (=*variegatus* var. *hebrideus* Edwards, 1926 and others, =*scutellaris* var. *hebrideus* Edwards, 1932 and others) from New Hebrides; Eastern New Guinea.

Aëdes (*Stegomyia*) *quasiscutellaris* Farner and Bohart (= *variegatus* (Doleschall) of Edwards, 1926 and others, = *scutellaris* (Walker) of Edwards, 1932 and others from Solomon Islands). Farner and Bohart (1944, *Proc. Biol. Soc. Washington*, 57 : 120) in proposing the new name *quasiscutellaris* have pointed out that the form which Edwards regarded as *variegatus* is not found in New Guinea and has in fact a restricted distribution which probably excludes the type locality of *variegatus* (Amboina) and of *scutellaris* (Aru Islands); they therefore hold that it is a new species. They have not attempted to recognize either *variegatus* or *scutellaris* since the type localities are outside the region they have under consideration. The name does not, therefore, necessarily replace either *variegatus* or *scutellaris* as used by Dutch and other workers who have been considering East Indian material.

Aëdes (*Stegomyia*) *marshallensis* Stone and Bohart, from Kwajalein, Namarik and Ebon Atolls and Kilji Island in the Marshall Islands.

Aëdes (*Stegomyia*) *guamensis* Farner and Bohart, from Guam.

The authors state that their studies of collections from Melanesia, Micronesia and Polynesia indicate that the species *pseudoscutellaris* is confined to Polynesia

and that the range of non-periodic filariasis is coincident with the combined ranges of *pseudoscutellaris* and *tongae*.

ii. *Aëdes* (*Stegomyia*) *hensilli* n. sp. from Ulithi Islands, Western Caroline Islands is described. It is a member of the *scutellaris*-group and would, in the nomenclature of Edwards 1932, be referred to as a variety of *scutellaris* Walker (=*variegatus* Dolschall of Edwards 1926). *John Smart.*

OLSON, T. A. & KEEGAN, H. L. **The Mosquito Collecting Program of the Seventh Service Command for 1942–1943.** *J. Econom. Entom.* 1944, Dec., v. 37, No. 6, 780–85.

EDNEY, E. B. **Laboratory Studies on the Bionomics of the Rat Fleas, *Xenopsylla brasiliensis*, Baker, and *X. cheopis*, Roths. I. Certain Effects of Light, Temperature and Humidity on the Rate of Development and on Adult Longevity.** *Bull. Entom. Res.* 1945, Jan., v. 35, Pt. 4, 399–416, 2 figs. [22 refs.]

It is generally agreed that epidemics of bubonic plague occur under conditions which allow rapid breeding of fleas and long periods of survival apart from the host; the estimation of the longevity figures is important, therefore, in the prediction and control of such epidemics. In the past, attention has been centred mainly on the effects of saturation deficiency on the larvae and adults, and the results obtained by different workers have varied considerably. In the present investigation, the author's main object was to ascertain whether other important factors are concerned in longevity, and, if so, to ascertain to what extent these explain the differences referred to. Since, in the past, little attention has been paid to the effects of light, this aspect receives special attention, and a considerable part of the paper is devoted to it. The work was carried out during the period December 1941 to June 1944, in Uganda. The experiments were made in a dark room in the laboratory, where the effects of humidity and light were studied under controlled conditions, but where it was not found possible to control the temperature accurately throughout the work. The significance of the results obtained, however, was not greatly diminished, since control series of fleas were kept at the same time for comparison of the effect of other factors. The following is the author's summary:—

"1. The effect of light on adult longevity and on the duration of pre-adult stages, and the effect of psychrometric [humidity] conditions during pre-adult stages upon adult longevity were investigated in *Xenopsylla brasiliensis* and *X. cheopis*.

"2. In no experiment was a significant difference found between the two species, but the figures shown are those for *brasiliensis* only, as the numbers of *cheopis* were small.

"3. Light reduces slightly the longevity of unfed, wild-caught adults, and of unfed laboratory bred adults; it reduces considerably the duration of all pre-adult stages. It is suggested that this is due to radiant heat.

"4. If fleas are anaesthetised while being removed from their hosts, the mean longevity is significantly reduced.

"5. It was confirmed that wild-caught females live longer than males, that the cocoon stage of females is shorter than that of males under all conditions used, and that newly emerged, unfed adults show no difference in longevity between the sexes.

"6. Eggs fail to develop at 24°C. if the saturation deficiency is 10 mm. Hg. or more; below this, saturation deficiency has little or no effect upon the duration of the egg stage.

"7. At 80 per cent. relative humidity, all the pre-adult stages are shorter at 35°C. than at 24°C. If all the adults are kept in the same conditions, those

resulting from pre-adults kept at the higher temperature live for a shorter period than those resulting from pre-adults kept at the lower temperature.

"8. At 24°C. the larval period increases from 12·4 to 25·1 days as the saturation deficiency increases from 2·3 to 8·8 mm. Hg., but this range of saturation deficiency has no effect upon the duration of the cocoon stage.

"9. Saturation deficiency during the pre-pupal stage is shown to bear a linear relationship to adult longevity.

"10. The results obtained by previous workers are discussed in the light of the present work, and a possible explanation is suggested for certain discrepancies that still exist."

This interesting paper contains much detailed information which does not lend itself to summary, and the work should be consulted in the original by those interested. *R. M. Gordon.*

ZUMPT, F. *Rhipicephalus sanguineus* Latreille und andere krankheitsuebertragende *Rhipicephalus*-**Arten.** [*R. sanguineus* **and other Disease Vectors of the same Genus.**] *Deut. Tropenmed. Ztschr.* 1944, Feb.–Mar., v. 48, No. 3–6, 117–28, 11 figs.

This paper presents a general account of the tick genus *Rhipicephalus* and discusses its medical and veterinary importance and the control measures which should be adopted when infestation occurs.

The features which distinguish the genus from other genera of Ixodidae are listed and the distribution of the 40 known species is briefly discussed. *R. sanguineus*, which is almost cosmopolitan in the warmer lands, is taken as a type and its anatomy is described and illustrated. The characteristic features of the following medically important species are given briefly :—*R. appendiculatus*, *R. simus*, *R. capensis*, *R. bursa*, *R. evertsi*, and *R. pulchellus*. All but the last resemble *R. sanguineus* in colour and general appearance. As in the case of all Ixodidae there are two larval stages—a six-legged larva and an eight-legged nymph.

The life-history of *R. sanguineus* under typical conditions is set out. The duration of the various stages at specified temperatures and their resistance to starvation are given. Although under the most favourable laboratory conditions the life-cycle may be completed in 76 days in nature in sub-tropical regions, there is probably only one generation each year.

The more important diseases of man and animals transmitted by these ticks and their distribution are briefly discussed in a short section on each disease. Some 16 diseases are dealt with in this way, including North African relapsing fever and the tick-borne typhus group.

Finally, there is a short section dealing with control measures. It is important to keep domestic dogs free from ticks, otherwise they may become established in houses. The dogs may be freed from ticks by bathing in 3 per cent. Creolin or carbolic soap, or treated by rubbing the coat with spirits of camphor and water. Derris powders are also effective. When a house has become infested fumigation is often the only remedy. For scouring, a 5 per cent. cresol or lysol-soap solution may be used. Cattle are commonly treated by dipping.

W. A. L. David.

EWING, H. E. **The Trombiculid Mites (Chigger Mites) and their relation to Disease.** *J. Parasitology.* 1944, Dec., v. 30, No. 6, 339–65, 8 figs. [Numerous refs.]

The paper, the contents of which are indicated in the title, is a summary of some aspects of present-day knowledge.

The author describes his own experience in rearing the common N. American "chigger mite," now known as *Eutrombicula alfreddugési*. A point of interest

is that the larva commonly feeds on turtles and toads, as well as mammals. The approximate geographical distribution of that species, and of three other important species (*T. autumnalis* of Europe; *T. deliensis*, India, East Indies, Queensland; *T. akamushi*, Japan to Malay Peninsula), is shown on a map.

The paper includes a revised key to genera of Trombiculid larvae of the world, and some notes and figures on points of taxonomic importance.

There is an interesting section on the pathology of the larval bite, and the human reaction. The account of the relation of *Trombicula* to scrub typhus, and the section on protection, are not of great value. The bibliography is up to date. *P. A. Buxton.*

LABORATORY PROCEDURES.

MacMahon, H. E. & DelVecho, S. B. **A Simple Technic for Rapid Sectioning.** *New England J. of Med.* 1944, Dec. 14, v. 231, No. 24, 794.

The rapid examination of tissue at the time of a surgical operation is usually made with frozen sections and this involves the use of a considerable amount of equipment; the following simple method has been used at the Cambridge Hospital, Massachusetts, U.S.A., for over a year. All the equipment required is a safety razor blade, a prepared stained slide, a clean slide and a clean coverslip; slides are coated with Mayer's albumin-glycerin mixture, dipped for a few seconds into a 1 per cent. aqueous solution of toluidin blue, drained and allowed to dry.

"Cut a thin section that can be easily handled. Holding the section on the blade, gently place it on the ball of the finger. Draw the stained slide lightly and quickly across the section, staining only one surface of the tissue. Immerse the tissue in water. Mount the tissue on a glass slide with the stained surface up. Place a coverslip over the section and with a good light examine the tissue."

This method has been compared with the usual freezing method, and also with permanent sections, with the same pieces of tissue—mammary gland, lymphatic gland, endometrial curetting tissue, uterine cervical tissue, and rectal mucous membrane; "in no case did the frozen section or final report conflict with the original rapid section diagnosis." *J. F. Corson.*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

i. Blacklock, D. B. **The Population Problem of India.** *Brit. Med. J.* 1943, Dec. 25, 805–7.

ii. Barrow, M. **Population Problems of India.** [Correspondence.] *Ibid.* 1944, Jan. 15, 95.

iii. Megaw, J. W. D. **India's Population Problem.** [Correspondence.] *Ibid.* Mar. 4, 335.

i. Professor Blacklock notes that the population of India (1941) was about 247 persons to the square mile, and that the vast bulk of the people live in villages; in 1931 the population had increased by 40 per cent. over that of 1881, and in 1941 an increase of about 15 per cent. over 1931 was recorded. The public health of India is poor, and the death rate is high. If as a result of enlightened land policy and improvement in public health the social conditions of the Indians become greatly improved, it seems inevitable that eventually there will be overpopulation even for the more productive land, and consequent starvation. The prospect of this situation calls for political and economic planning, but it is impossible for medical men to accept any suggestion that

limitation of population by disease should be allowed to continue if the means for prevention or cure could be applied. The author mentions other checks on population—war, infanticide—which have operated but which perhaps may be avoided in the future, and is driven to the conclusion that the solution of this urgent population problem will lie in some form of birth control. He adds a warning that the situation is likely soon to develop to a critical point, and that a course of action must be decided early ; it will not bear much delay.

ii. In a letter commenting on Blacklock's paper, BARROW quotes evidence which shows that at the present time India produces enough food to give 88 per cent. of the population a daily ration of 2,800 calories, if none was exported and if there were no maldistribution. Proper utilization of land would mean that the country could produce nearly 4½ times as much food, which should be enough for a population three times as great as that which exists at present.

iii. In a contribution to this discussion Sir John MEGAW criticizes the figures given by Barrow as fantastically optimistic, and, in general, supports Blacklock's views. The solution of the problem lies in increasing the production of food and in regulating the rate of reproduction of children, so as to maintain a satisfactory balance between food supply and population.

These papers should be read in conjunction with that by NOTESTEIN, below.,

Charles Wilcocks.

NOTESTEIN, F. W. **Problems of Policy in relation to Areas of Heavy Population Pressure.** *Milbank Memorial Fund Quarterly.* 1944, Oct., v. 22, No. 4, 424–44.

In his discussion of this complex subject the author takes certain countries as examples of those parts of the world in which rapid increase of population has taken place and which may, in a relatively short time, become so overpopulated in relation to their present means of production that very grave sociological results would be inevitable. India, for instance, would double its present population (400 millions or so) in 57 years if the trends of 1921–1941 continued ; Java would do the same in less than 40 years and the Philippines in 32. Similar situations exist in many other parts of the world, especially among those peoples who are, technologically, undeveloped. "Unless there are drastic changes sooner or later there must come a point at which continued increase forces down living levels, so that mortality will begin to rise." The limits of agricultural improvement were virtually reached in Java in 1930.

The author considers possible methods by which this overcrowding may be prevented. Emigration, even if successful, would effect no more than temporary alleviation ; to allow mortality to increase would offend the humanitarian attitude of enlightened people, and would not succeed ; birth control is not a method which commends itself to primitive people, whose social structure aims at preservation of the family or group rather than of the individual. More advanced peoples, whose outlook is more individualistic, have succeeded in restraining their own multiplication in spite of low mortality, and the author concludes that the welfare of the less developed peoples in this respect rests upon a programme which will bring about a decline of fertility by improving standards of living, urbanization, widespread education and growing contacts with foreign cultures. The first effect would probably be to increase population pressure, but there would follow a decline in fertility which would in due course form a balance with the decreased mortality which these measures would achieve. The subject touches upon public health in that the author believes that "only a society in which the individual (child or adult) has a reasonable chance for survival in healthy life will develop that interest in the dignity and material well-being of the individual essential to the reduction of fertility." Public health should therefore be fostered as part of a programme to reduce growth potential.

Agricultural, political and social development (such as the breaking down of caste and other barriers) are essential parts of the programme outlined.

Charles Wilcocks.

VINT, F. W. **Solar Rays. Facts or Fiction ?** *East African Med. J.* 1944, Aug., v. 21, No. 8, 227–39. [64 refs.]

In this paper Vint has made a survey of the possible effects of the sun's rays on the living organism, as a preliminary statement bearing on the physiology of the African ; he was prompted to this by the realization that no satisfactory explanation has yet been given of the lack of development of the African, and he took as his starting point the fact that the African has a black skin.

Pigmentation which develops as a result of exposure to the sun is said always to be extracellular, and Vint has seen extracellular pigment in Africans, and sees no reason why a light-skinned African should not develop extra pigment. [The demarcation of areas of skin usually covered by clothing, from those usually exposed to the sun, is often very clear in black skins in Africa.] Black surfaces absorb more heat than white surfaces, and the heat thus taken in is lost by evaporation of sweat ; it has been stated that in the coloured races there are more sweat glands than in the white races, and that there is a richer blood supply in the skin. The sweating mechanism works more economically in the black races, but adaptation to tropical conditions, though good, is not complete, and heat stroke is by no means unknown in Africans.

Vint discusses at some length the physiology of sweating and the importance not only of loss of fluid, but also of loss of salts in this process. The production of histamine by the skin, probably increased if the skin is injured, may be a factor in tropical physiology. Histamine provokes the secretion of acid in the stomach, and it has been said that the normal Indian has a higher gastric acidity than the normal European ; pernicious anaemia is rare in the tropics. Histamine provokes tissue breakdown, and it is perhaps possible that an over-production of histamine, due to exposure, may be a factor in the under-nourishment of the African living on a border-line diet.

In a hot climate the basal metabolism is reduced ; the thyroid gland is intimately concerned in metabolic activity, and KEITH has stated that the dweller in Eastern Asia belongs to the hypothyroid race. [The assumption is that the same may be true of the African.]

Vitamin D is formed by the photochemical action of ultraviolet light on the sterols ; it is formed on, not in, the skin, and it has been said that food is not generally an important source of this vitamin, but that it is taken into the body (in animals and birds) either by ingestion from the skin (as in licking or preening) or by absorption through the skin. Certainly rickets is rare in Africa, and the reason probably is the formation of vitamin D by the action of sunlight on the excreted fatty material of the skin. It has been said that removal of the thymus increases the severity of rickets in animals, and decreases the effect of vitamin D ; Vint has noticed that a persistent thymus is a very common finding at autopsy in Kenya.

Reviewing these facts and theories, the author maintains that a case has been made for " a complete investigation of the physiology of the African before any other researches are carried out as to the cause of his lack of development."

Charles Wilcocks.

DEMBOVITZ, N. **Psychiatry amongst West African Troops.** *J. Roy. Army Med. Corps.* 1945, Feb., v. 84, No. 2, 70–74.

The author, an Army psychiatrist working among West African troops in India, stresses the importance of a working knowledge of the social life, habits, beliefs and customs of an individual's social group if the significance of any

unusual behaviour or thought is to be adequately assessed. In the first part of his paper he describes those aspects of personality which are common to nearly all West Africans, as well as individual differences of the main ethnological and geographical sub-groups. He then refers to the special problems in management which these personality features present. The third part of the paper enumerates and describes various psychiatric symptoms and syndromes commonly seen in these peoples, and he concludes by describing the therapeutic measures which he has found to be appropriate.

The West African is an easy-going, unambitious, ingenuous individual possessed of a child-like simplicity and humour—like a child closely tied to his parents and his brothers. He is child-like in his emotional responses, reacting sharply to any imagined attack upon his rights, easily influenced by the attitudes of his group, highly superstitious, and obeying the laws of his Juju meticulously and without question. The educated boy tends to be more litigious and less contented than his uneducated fellow. In India, the West African makes a reasonable adjustment although he tends to become more excitable and irritable. General intelligence is low when assessed by European standards—a score of 20 (S.G.5) on the standard Raven's Progressive Matrices test is the average (although European norms for such a test are scarcely appropriate)—but certain specific aptitudes such as mechanical, sense of locality, etc., are fairly high.

From a psychological as well as a physical and ethnological viewpoint West Africans may be divided into two main groups—Northern Territory men comprising the Hausas, Fulanis, and pagan tribes of the northern territories of the Gold Coast and Nigeria ; and secondly, the Coast Africans consisting of a large group of linguistically separate tribes inhabiting the coastal areas.

The Northern Territory men are first-class fighting soldiers with their good physique, their courage, their pride in arms and their amenability to discipline. They have some Arabic ancestry and the dominant Fulanis and Hausas are Mohammedan, while the indigenous tribes remain pagan. They share a common language and form small agricultural communities each under its own chief. All believe in Juju, but they are much less concerned with magic practices than the Coast Africans of the South. They present few special psychiatric problems.

The Coast Africans form many separate tribes each with its own culture and social organization, traditionally at war with each other, and speaking mutually incomprehensible languages. Whatever their professed religion, they are pagan at heart and are bound together in their fanatical belief in Juju—the conferring of magic power for good or evil on an inanimate object by a ceremony. Juju is invoked in every mental upset ; whatever befalls a man is due to an angry Juju which has been placed within him. In their rich folklore is implicit the belief in the power of the dead over the living and in the existence of various supernatural beings. The preoccupation with magic practices, the existence of numerous secret societies (many of which are widespread and anti-social) the occasional occurrences of cannibalism and human sacrifice (many of the criminals being the semi-educated townsmen) present problems both disciplinary and psychiatric.

Next are described various problems in man-management provided by the West African's poor intelligence, his child-like and egotistical emotional attitudes, his lability of mood and the cultural setting from which he has come.

The author then details the psychiatric syndromes which are of special frequency. Hysterical states are frequent and dramatic, and the hysterical mechanism is so readily employed that conversion symptoms colour not only neurotic depressions and anxiety states but also true psychoses. Hysterical reactions are invariable in mental defectives. Psychopathic personalities with anti-social trends are a special problem, with their ready resort to violence and great physical strength. " Running amok " is not uncommon in manic and

schizophrenic reactions, in epilepsy, psychopathic personality, acute trypanosomiasis and cerebral malaria ; the picture is one of a man suddenly seizing a tommy gun and rushing round slaying all he meets. Hallucinations are of little significance ; normal West Africans see and speak to their dead parents, and terrifying hallucinations are common in anxiety and hysterical states of good prognosis. Trypanosomiasis accounts for over 10 per cent. of acute mental illness—often diagnosed as acute mania or catatonic schizophrenia before c.s.f. investigations reveal the true pathology—and lumbar puncture should be performed on every psychotic patient. "Recurring confusional state," apparently hysterical, of about a month's duration, and recurring at a particular season every year, is a special condition found in West Africans ; the attack ceases spontaneously in its natural time and the West African abroad tends to pass into a Ganser state at the conclusion of each attack.

The precipitating factor in psychoneurotic states is commonly obvious and trivial—an imagined insult or an undeserved sentence may be the sole precipitating factor in a severe condition—and the illness clears up dramatically if such environmental factors can be dealt with successfully. Hysterical symptoms respond well to strong positive suggestion of a crude sort, whereas the response to hypnosis or narco-hypnosis induced by Europeans is poor. The management of psychotics is on orthodox lines. Sedatives are effective only in very large doses—for example one grain of morphine with 1/25th of a grain of hyoscine, or ten drachms of paraldehyde. The author has found occupational therapy useful in certain cases. *James Milne.*

CAMERON, T. W. M. **On the Centenary of the Birth of Patrick Manson, the Father of Modern Tropical Medicine.** Reprinted from *McGill Med. J.* 1944, Oct., v. 13, No. 6, 14 pp.

In this address Professor T. W. M. Cameron has reviewed the outstanding events of the life of Sir Patrick Manson on the occasion of the centenary of his birth (October 3rd, 1844), and has taken advantage of this notable occasion to compare his career with that of another great pioneer, Sir William Osler. It is also revealed that it was due to the initiative of the latter, in a letter dated February 3 d, 1907, that the question of a school of parasitology in McGill University was first raised, a proposal which eventually resulted in the establishment of the Institute of Parasitology at Macdonald College, P.Q.

In this manner we are introduced to the new diploma in tropical medicine of McGill University, of which this Institute forms one of the foundation stones, It will be responsible for the laboratory didactic instruction on tropical diseases. The other basic subjects will be public health, preventive medicine and clinical instruction in diseases common in the tropics, but this diploma will contain one important innovation in the teaching of tropical medicine, for at least part of the clinical instruction will take place in the tropics, a course which has now become practicable when Trinidad may be reached by aeroplane within twelve hours. It seems quite logical after preliminary instruction in the laboratory on the aetiology, pathology and prevention of tropical diseases, to repair to those countries where these diseases exist, and there under experienced practitioners, to apply the facts and procedures learned in Canada.

Sound training in general principles of public health and preventive medicine should provide the physician proceeding to the tropics with a secure foundation and should assist him in attaining the ideals set forth in Osler's address to Manson's students at the original London School of Tropical Medicine in 1909.

P. Manson-Bahr.

BOOK REVIEWS.

KNIGHT, K. L., BOHART, R. M. & BOHART, G. E. **Keys to the Mosquitoes of the Australasian Region including a Synopsis of their Distribution and Breeding Habits.** 71 pp. National Research Council. Division of Medical Sciences. Issued by the Office of Medical Information. (Under grant of Johnson & Johnson Research Foundation.) Washington. 1944, July.

In this paper the Australasian region is regarded as including the Tuamotu Archipelago in the East and the Marianas and Hawaian Islands in the North; species from the Moluccas are included in order to cover the possibility of oriental species found there extending to New Guinea but not yet having been recorded from that island. New Zealand, Tasmania, Victoria, South and West Australia are excluded from consideration, as being without the main area of current military interest.

The paper, which is a duplicated product, not a printed work, contains a key to the tribes of Culicidae "taken direct from EDWARDS (1932)" (*Genera Insectorum*, Fasc. 194); a key to *Bironella* "modified from SWELLENGREBEL and RODENWALDT (1932)" (*Die Anophelen von Niederländisch-Ostindien*, Fischer, Jena); a key to the species of *Anopheles* "taken partly from RUSSELL, ROZEBOOM and STONE (1943)" (*Keys to the Anopheline Mosquitoes of the World*, Amer. Ent. Soc., Philadelphia, Pa.); keys to the genera and to the species therein. The latter keys are mainly applicable to females, though not entirely so; a table giving the larval habitats, where known, is included but there are no keys to the larvae.

The generic concepts used are the broad ones of EDWARDS (1932), but the authors have keyed out the species contained in these genera without keying out the sub-genera. This simplification is carried to the length of combining the species of *Armigeres* and *Aëdes* in one and the same key. It thus comes about that specimens of a sub-genus passed through the key may not key out together or in a manner that points to their relationship. Furthermore, should specimens that happen to represent a new sub-genus come to hand—and STONE & BOHART (1944, *Proc. Ent. Soc. Washington*, v. 46, 205) have recently erected two new sub-genera within the genus *Aëdes* for Australasian species—the position in the key to which such specimens will pass gives no positive indication of the relationships of the new sub-genus.

The authors follow RUSSELL, ROZEBOOM and STONE in using trinominal names, thus indicating that they regard the forms usually designated by the non-committal if ambiguous term "variety." as sub-species. They limit their remarks on zoogeography to a quotation of 14 lines from EDWARDS's (1924, *Bull. Ent. Res.*, v. 14, 351) paper on the Mosquitoes of the Australasian region. Edwards in 1924 (*loc. cit.*) dealt with 145 species; the present authors deal with 238 species and sub-species, but they candidly admit that they have seen specimens of only about half of these and that their paper is to be regarded as "of a preliminary nature."

John Smart.

TAYLOR, F. H. **The Intermediary Hosts of Malaria in the Netherlands East Indies.** *Commonwealth of Australia Dept. of Health Service Publication* (*School of Public Health and Tropical Medicine*). No. 5. (Second Edition). 1944, Oct. 30, 100 pp. With 24 figs., 1 graph & 16 maps. Glebe, New South Wales: Australasian Medical Publishing Company, Ltd., Seamer and Arundel Streets.

The first edition of this publication was issued in 1943 [reviewed in this *Bulletin*, 1944, v. 41, 698] and the fact that a second edition has had to be issued in less than a year's time proves its usefulness.

The first edition ran to 85 pages. The additional pages in the second edition are taken up with descriptions of *Anopheles hyrcanus* Pallas (the typical form) and *Anopheles hyrcanus X* Venhuis and with "Notes on the Distribution of Malaria" by Dr. R. E. Murray (10 pages and sketch map).

Apart from the new matter, mentioned above, the second edition does not differ from the first. *John Smart.*

GASCHEN, H. [Dr. ès Sciences chef de travaux à l'Institut d'Hygiène Lausanne (Suisse).] Les Glossines de l'Afrique Occidentale Française. [**The Tsetse Flies of French West Africa.**]—*Acta Tropica.* Basel. 1945, Suppl. 2, 131 pp., 114 figs. & 1 folding pl. [Bibliography.]

In the introduction by ROUBAUD it is stated that this book on the tsetse flies of French West Africa is intended for "administrators, missionaries, doctors, hygienists, farmers and business people."

After listing 21 species and eight varieties the author briefly describes the general anatomy of the fly. The main section of the book, consisting of about 60 pages, contains a key for the identification of the 12 species which occur in this part of Africa; detailed descriptions of the species; line drawings of differentiating characters and maps showing their distribution. Those occurring in other parts of Africa are dealt with in less detail. Habits, haunts and relation to disease are noted for each species but are more generally discussed in a chapter dealing with biology. To conclude, the author mentions some of the measures used for the control of the tsetse fly and describes certain methods for collecting, dissecting and examination.

There is a short glossary of entomological terms at the end of the book; a hundred or so references to the literature by French, British and a few German authors and a large, folding, illustrated key to the local species of *Glossina.*

This is not a work for the advanced student, but is a useful introduction to the subject and a handy book of reference for those for whom it was written.

H. S. Leeson.

HELANDER, E. V. Uber die Magensekretion bei Bothriocephalusträgern. [**The Gastric Secretions in Persons harbouring** *Diphyllobothrium latum.*] *Acta Med. Scandinavica.* 1945, Suppl. 155, 115 pp., 2 figs. [Bibliography.]

In view of the similarities in the blood of those suffering from idiopathic, spontaneous or, better, cryptogenetic pernicious anaemia and the severe form of anaemia which may arise in some of those who are infested with *Diphyllobothrium latum*, and in view of the changes in the gastric secretions in the former, it is well that we should know whether the like changes occur in the latter. Therefore, in spite of the fact that no striking alterations have been found and the results of this investigation are largely negative, the time spent on it cannot be regarded as wasted. [We should remember, also, that though severe anaemia *may* occur in those harbouring this cestode, many persons are infested without exhibiting any profound alteration in the blood.] The work must have been somewhat tedious, but it has been carried out with thoroughness and should, therefore, not need to be repeated.

Apart from a short introduction and a brief summary, the report of the work is divided into ten chapters. In his introductory remarks the author states that infestation with *Diphyllobothrium latum* is common in Finland, where the study has been undertaken. Records have been published showing that 20–25 per cent. of the inhabitants of parishes near the coast, and 40–50 per cent. and even more in the eastern parts are infested. Symptoms are often mild and vague:

sensations of fulness in the epigastrium, hunger and general discomfort, with craving for salty foods, glossitis, diarrhoea lasting for a few days, feelings of faintness, perhaps paraesthesia of the hands.

In the first chapter is considered generally the question of gastric secretions and anaemia, with abundant quotation from the literature, noting particularly the achylia common in cryptogenetic pernicious anaemia. The author quotes WEINBERG as saying that in families in which cases of pernicious anaemia occur other members may show a reduction in the normal HCl content of the gastric juice [but does not state that these might be in an early stage of the disease]. In both cryptogenetic pernicious anaemia (to save space and repetition we shall henceforth call this c.p.a.) and *Diphyllobothrium* anaemia (in future, D.p.a.) signs of gastritis with atrophic histological changes may be seen, more in the fundus than at the pylorus. Several authorities have stated that the "intrinsic factor" is deficient or lacking in c.p.a., though free HCl is present, but that total gastric secretion is reduced. In D.p.a. the intrinsic factor is probably always present, but it is possible that the supply of the anti-anaemic principle in the liver is exhausted or its utilization prevented.

In the second chapter the author sets out the problems which he proposes to solve, at least to tackle. Hitherto in worm-carriers the investigation of the gastric function has been mainly confined to the question of secretion of HCl. He sets out to determine the following :—(1) The hydrochloric acid. (2) The total chlorides. (3) The intrinsic factor. (4) The pepsin. (5) The secretion of the gastric juice. (6) Whether the amount of the intrinsic factor is quantitatively reduced in D.p.a.

The next chapter is concerned with the methods in general use for carrying out gastric analyses and, in particular, the TAYLOR and LASCH reaction for estimation of the intrinsic factor. One method which the author uses must be given in a little more detail because in subsequent chapters and in the discussion he frequently uses terms which he here defines. For making fractional tests, after the patient has fasted for 10 hours a fine sound is passed to a distance 40-50 cm. from the teeth and the stomach contents are withdrawn ; these are the "resting content" (*Ruhe-inhalt*) ; after an interval of 10 minutes, suction is again carried out three times and the material obtained he calls "empty secretion" (*Leersekret*). A drink of caffeine 0·2 gm. in 300 cc. of water with addition of two drops of methylene blue solution is then given through the sound, and every ten minutes thereafter 15 cc. are withdrawn, until the colour disappears. The gastric juice so obtained is called the "after-secretion" (*Nachsekret*) and the time between the giving of the fluid and the disappearance of the blue colour is the emptying time (*Entleerungszeit*). The different amounts withdrawn are examined for estimation of HCl and total acidity and can be added together. In those whose *Leersekret* does not give a positive Congo-red reaction and at least after 30 minutes from the taking of the fluid, 16 units of insulin are injected intravenously or, if the vein is hard to find or unsuitable, 0·1 cc. of histamine per 10 kgm. body-weight subcutaneously. The methods of estimating the HCl, total acidity, total chlorides, intrinsic factor, pepsin, etc., are detailed.

The author next states the nature of his investigation material. This comprised 51 carriers of *Diphyllobothrium latum*, 25 females, 26 males, between 18 and 45 years of age, 23 patients with pernicious anaemia, of whom 17 were harbouring the worm, and 30 normal persons, 21 women, 9 men, 17–44 years old. He also planned to keep the worm-carriers under his observation for two months after the worms had been got rid of, and the pernicious anaemia patients after remission. When their worms had been expelled several of the sufferers, feeling well, refused further investigation, so only 20 could be subjected to subsequent examination.

The two following chapters are concerned with the gastric secretion and its constituents in normal subjects; first, the records of others already in the literature, and then the author's own findings, details being presented in series of protocols which are summarized below. After this, the secretion in *Diphyllobothrium* carriers, which is the title chosen for the whole work, is treated in a similar manner, one chapter being concerned with a recording or summarizing of earlier work and another with the author's own findings in a series of protocols with explanatory letterpress. Chapter IX goes over the same, or, rather, similar ground with cases of pernicious anaemia, those with worm infestations, before and after remission, and then cases of cryptogenetic pernicious anaemia.

The results may be summarized as follows:—In cases of pernicious anaemia and in those harbouring *Diphyllobothrium latum* there are variations in the gastric secretions, quantitatively within the limits regarded as those of health. Earlier studies have proved that, as regards gastric acidity, there is no marked departure from the normal and there is no difference in the two sexes. [Previous investigators have recorded their results in the sexes separately; the author, finding no practical difference, has dealt with the subject as a whole and not split them into two sex-groups.] The variations in the gastric secretion as a whole and in its constituents have (with one exception among 20 cases) been within the normal limits. Studies carried out on the same person on successive days have shown that the acidity and the amount of pepsin present may vary. Only after many fractional removals have been carried out on worm-carriers, before and after removal of the parasite, and comparing the averages so obtained can we give any satisfactory answer to the question whether the presence of the worm has any effect on the gastric secretion. He finds the differences in these averages too slight to warrant any definite answer. Moreover, if we compare the findings in worm-carriers with those in the healthy we get the same results. Ten out of 30 healthy subjects and 14 out of 41 carriers of the worm showed so long a delay that 30 minutes after taking the test-drink there had been no secretion of free HCl. The average values in carriers and in the healthy after the giving of insulin or histamine, differed no more than in those who had not received either. Of 51 carriers three still had achylia, but none of the healthy. The average amounts of acid, total chlorides and of pepsin in the carriers after insulin or histamine were below those of healthy subjects who had been given insulin. Mucus was present just as often in the healthy as in the carriers. The average amount of secreted juice in carriers not receiving insulin or histamine was somewhat higher than in the healthy; it was as if the presence of the worm had a stimulating effect on the gastric secretion.

The time of emptying the stomach was usually shorter in carriers than in the healthy. The average of the intrinsic factor reaction was not much different from that in the healthy. In the majority of the author's worm-carrying patients the total amount secreted was greater than in the healthy, but in a minority it was definitely lower; hence not much stress can be laid on this. In all the cases of c.p.a. insulin-negative achylia was found both before and after remission; of 17 D.p.a. cases 15 showed insulin-negative achylia and after remission [presumably, removal of the worm] 10 of the 17 showed the same. Total chloride estimations yielded similar results: some cases of both groups of anaemia (c.p.a. and D.p.a.) gave an amount lower than, others an amount equal to, that of the healthy. But the average total chloride concentration, which rises somewhat after a remission, is still definitely lower in the healthy and in the c.p.a. cases than in those of *Diphyllobothrium* origin.

Digestive pepsin shows similar variations. Cases in which it was lacking were found in both forms of anaemia. Prior to remissions the amount of pepsin in c.p.a. does not reach the level of the healthy subject, whereas in some of the

D.p.a. cases it does. The intrinsic factor reaction in c.p.a. he found somewhat higher than in the healthy ; it is higher also than in cases of D.p.a. By Taylor's method of estimating this factor, the stomach in some c.p.a. cases, at least after insulin stimulation, can secrete as much as a healthy organ ; in others, however, the quantity is distinctly less because of the reduced total amount of gastric secretion. It is known that in c.p.a. the stomach is dry and that maintaining its secretion without insulin or histamine stimulation is difficult. Earlier researches had recorded that in c.p.a. the intrinsic factor of the gastric content was not diminished, but that the total amount was less because the secretion as a whole was reduced and the author thinks it is more probable that we have to do with a functional inadequacy of the glands secreting the intrinsic factor.

We have given in the foregoing an analysis of the author's statements as fully as we can, as the subject is an important one to have once for all settled. They are often vague and obscurely worded. It will perhaps make the results a little clearer if we give the author's conclusions in his own words (translated). After stating that in those harbouring this worm the stomach is usually emptied more quickly than in normal subjects, he says :—

1. Of 51 *Diphyllobothrium latum* carriers three had insulin- or histamine-negative achylia ; in 11 (of the 51) the HCl and the total acidity were less, but in the majority they were somewhat raised.

2. The total chlorides in a minority (14 out of the 51) were reduced, in a great majority somewhat increased.

3. Assuming that Taylor's method is reliable, the intrinsic factor is not reduced in the worm-carriers.

4. In 14 of the 51 pepsin digestion was somewhat reduced, but in the majority it was somewhat increased.

5. In a minority (14) the resting content, *Leersekret* and *Nachsekret* were less ; in a majority the *Leersekret* was equally large and the resting content and *Nachsekret* greater.

6. In pernicious anaemia due to *Diphyllobothrium latum* the gastric secretion contains as much as, and in other cases [? c.p.a.] more intrinsic factor than is found in healthy subjects.

" It is difficult to account for these varying results. . . . It may be that the *Diphyllobothrium* toxin acts reflexly or directly on the blood-vessels of the gastric glands and that, according to the mode of reaction and perhaps also the resorption in the intestine, the stomach secretion is reduced in some of the cases, is increased in a majority and remains unchanged in others. [If this is not mere tautology, it is totally unenlightening.] Also the increased gastric secretion and increased acidity would explain the sensations of hunger in worm-carriers . . . . The average amount of *Leersekret* and of *Nachsekret* after insulin is reduced both in cryptogenetic and in *Diphyllobothrium* pernicious anaemia. Accordingly the total amount of intrinsic factor secreted in pernicious anaemia is reduced. In a few cases of pernicious anaemia the amount of *Leersekret* and of *Nachsekret* after insulin administration and the total amount of the intrinsic factor may be as much as in healthy subjects."

With findings so variable, values being sometimes higher, sometimes lower than, sometimes equal to those of healthy subjects, one can only sympathize with the author in the barrenness of the reward for so much work. The important fact which does emerge is that no reliance can be placed on gastric analysis in interpreting the effects of the presence of this cestode in man.

H. Harold Scott.

MOZLEY, Alan [D.Sc. (Edin.), F.R.S.E.]. **The Control of Bilharzia in Southern Rhodesia.** 307 pp. 1944. Salisbury, Southern Rhodesia.

This book deals mainly with the biology, distribution and control of the two species of molluscs serving as bilharzial intermediaries in Southern Rhodesia: *Physopsis globosa* transmitting *Schistosoma haematobium*, and *Biomphalaria pfeifferi* (formerly *Planorbis pfeifferi*) transmitting *S. mansoni*. It would appear (p. 31) that *P. globosa* is the more widespread, as BLACKIE found in 1932 [this *Bulletin*, 1932, v. 29, 401] and that the two species are associated with each other and with a considerable degree of pollution of their habitats. The sparseness of limestone rocks, the low organic content of most soils, and the long periods of drought in the country, are all factors unfavourable to these snails and, indeed, the two vectors tend to be restricted to small man-made pools polluted with organic matter, residual pools in the bed of intermittent streams, and small perennial streams, mostly on the High and Middle Veldt. Aquatic vegetation or a bottom of organic mud is a necessary part of the habitat. Schistosomiasis is increasing in the country and, in Mozley's view, control of the intermediaries is both highly desirable and largely practicable.

The greater part of the book (pp. 32–220) is a list of sampling points on streams and in pools, classified under drainage areas and containing notes on all molluscs found; this will doubtless be of use if a control campaign is undertaken. There are also some full chemical analyses of pool and stream waters, of snails, and of their shells. Another long section (pp. 223–280) dealing with chemical control mainly describes the successful use of the mineral basic copper carbonate, Malachite. This mineral has its low solubility increased by plant acids and by the saponin-containing powdered dried pods of a common tree, *Swartzia madagascariensis*. This powder is itself toxic to snails, as are also various extracts of other plants: *Tephrosia vogelii*, *Eucalyptus* sp., *Copaifera mopane*, and *Pterocarpus angolensis* ("*Mukwa*"). Malachite mixtures promise to be both effective against snails and harmless to mammals.

While the book contains a mass of useful data, they are largely undigested and loosely thrown together. Thus, the chemical control section consists of tabulated laboratory notes in which there is no way of finding (say) what malachite mixture to use, without searching the tables line by line. And it is not clear whether the 189 pages of habitat notes are summarized inadequately on pp. 31–32, or not at all. *B. G. Peters.*

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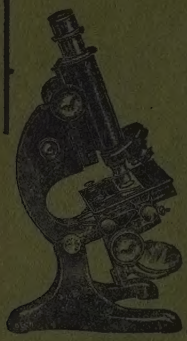

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